ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Abaco Systems / SBS G2-PLUS-1N-12-H* at our website: *Click HERE*

Hardware Reference Manual

G2 Graphics PMC Family Hardware Reference Manual

Publication No. G2_PMC_Family_HRM Rev. A



abaco SYSTEMS

Document History

Revision	Date	Description
0.7	December 2005	Original Release
0.8	January 2006	Added Torque and 7mm screw detail
1.0	June 2006	Added Air-cooled installation instructions
1.1	September 2008	Removed reference to ATI driver support
A	February 2018	Rebrand to Abaco format

Waste Electrical and Electronic Equipment (WEEE) Returns



Abaco Systems is registered with an approved Producer Compliance Scheme (PCS) and, subject to suitable contractual arrangements being in place, will ensure WEEE is processed in accordance with the requirements of the WEEE Directive.

Abaco Systems will evaluate requests to take back products purchased by our customers before August 13, 2005 on a case by case basis. A WEEE management fee may apply.

About This Manual

Conventions

Notices

This manual may use the following types of notice:



WARNING

Warnings alert you to the risk of severe personal injury.



CAUTION

Cautions alert you to system danger or loss of data.



NOTE

Notes call attention to important features or instructions.



TIP

Tips give guidance on procedures that may be tackled in a number of ways.



LINK

Links take you to other documents or websites.

Numbers

All numbers are expressed in decimal, except addresses and memory or register data, which are expressed in hexadecimal. Where confusion may occur, decimal numbers have a “D” subscript and binary numbers have a “b” subscript. The prefix “0x” shows a hexadecimal number, following the ‘C’ programming language convention. Thus:

One dozen = 12_D = 0x0C = 1100_b

The multipliers “k”, “M” and “G” have their conventional scientific and engineering meanings of $x10^3$, $x10^6$ and $x10^9$, respectively, and can be used to define a transfer rate. The only exception to this is in the description of the size of memory areas, when “K”, “M” and “G” mean $x2^{10}$, $x2^{20}$ and $x2^{30}$ respectively.

In PowerPC terminology, multiple bit fields are numbered from 0 to n where 0 is the MSB and n is the LSB. PCI terminology follows the more familiar convention that bit 0 is the LSB and n is the MSB.

Text

Signal names ending with a tilde (“~”) denote active low signals; all other signals are active high. “-” and “+” denote the low and high components of a differential signal respectively.

Further Information

Abaco Website

You can find information regarding Abaco products on the following website:

LINK
https://www.abaco.com

Abaco Documents

This document is distributed via the Abaco website. You may register for access to manuals via the website.

LINK
https://www.abaco.com/products/dcpmc

Third-party Documents

PICMG 2.0 CompactPCI Specification Rev 3.0, October 1999

PICMG 2.3 PMC on CompactPCI Rev. 1.0, August 1998

LINK
https://www.picmg.org/

PCI Local Bus Specification PCI Special Interest Group, Revision 3.0

LINK
http://www.pcisig.com/

Draft Standard for Common Mezzanine Card Family CMC, IEEE Department, P1386/Draft 2.0

Draft Standard Physical and Environmental layers for PCI Mezzanine IEEE Standards Department, P1386/Rev 1.0

IEEE 1102.1-2201 Conduction-cooled CompactPCI Carrier Card

LINK
https://www.ieee.org/index.html

NOTE
Technical literature describing components used on the G2 Graphic PMC card is available from the manufacturers' websites.

Technical Support Contact Information

You can find technical assistance contact details on the website Embedded Support page.

LINK
https://www.abaco.com/embedded-support

Abaco will log your query in the Technical Support database and allocate it a unique Case number for use in any future correspondence.

Alternatively, you may also contact Abaco's Technical Support via:

LINK
support@abaco.com

Returns

If you need to return a product, there is a Return Materials Authorization (RMA) form available via the website Embedded Support page.

LINK
https://www.abaco.com/embedded-support

Do not return products without first contacting the Abaco Repairs facility.

Contents

About This Manual 3
1 • Introduction 10
1.1 Purpose of This Guide 10
1.2 Overview of G2 Graphics PMC Family 10
1.3 Specifications Reference 13
1.4 Block Diagram 13
1.5 Required Software Drivers 14
1.6 Related Documents 15
1.7 Safety Notices 15
1.7.1 Handling 15
2 • Required Environment 16
2.1 General PMC Site Requirements 16
2.2 Power Requirements 16
2.3 Thermal/Cooling Requirements 16
2.4 Signal Routing Requirements to Displays And Video Sources 16
2.5 Software Drivers 16
3 • Hardware Installation 17
3.1 Introduction 17
3.2 Installation Equipment Needed 17
3.3 Configuration Jumpers 17
3.4 Installation 17
3.4.1 Air-Cooled Models 17
3.4.2 Conduction-Cooled Models 19
3.5 Verifying Correct Installation 27
4 • Getting the Software Going 29
4.1 Introduction 29
5 • Hardware Interfaces 30
5.1 Connectors 30
5.2 Connector Pin Assignments 30
5.3 PCI Bus Compatibility 30
5.3.1 General 30
5.4 Temperature Sensor 30
6 • Functional Blocks 30
6.1 ATI M9 GPU 30
6.2 Second Display Output Components (G2 Dual and Plus) 31
6.3 Video Capture Components (G2 Plus) 31
7 • Resources 32
7.1 Memory and I/O Address Mapping 32
7.1.1 PCI Buses 32
8 • Specifications 33
9 • Riser Modules 34

9.1 Introduction 34
9.2 Display Output 1 and Display Output 2 Riser Modules 35
9.2.1 Functional Diagram 35
9.2.2 Mode Configuration 35
9.2.3 Connector Pin Out 36
9.3 G2 Video Capture Riser Module 38
9.3.1 Functional Diagram 38
9.3.2 Mode Configuration 39
9.3.3 Connector Pin Outs 40
9.4 Cabling 42
A • G2 PCI Subsystem Values 43

List of Figures

Figure 1-1 G2 Basic (Air-Cooled Version) 11
Figure 1-2 G2 Plus (Air-Cooled Version) 12
Figure 1-3 G2 Family Block Diagram 13
Figure 1-4 G2 Family Detailed Block Diagram 14
Figure 3-1 G2 Basic PMC Installation 18
Figure 3-2 G2 Dual/Plus PMC Installation 19
Figure 3-3 Heat Rib Installation 21
Figure 3-4 G2 Basic PMC Installation 23
Figure 3-5 Heat Rib Installation 25
Figure 3-6 G2 PMC Installation 27
Figure 9-1 G2 Riser Modules Shown with G2 Plus 34
Figure 9-2 G2 Riser Modules in Use with G2 Plus 34
Figure 9-3 Display Output Riser Modules Block Diagram 35
Figure 9-4 Display Output Riser Module – Switch Settings 36
Figure 9-5 J6 Pinout 38
Figure 9-6 G2 Video Capture Riser Module – Block Diagram 39

List of Tables

Table 9-1 J5 Pinout 36
Table 9-2 J7 Pinout 38
Table 9-3 Video Capture Module – Switch Settings 39
Table 9-4 J5 Pinout Table for Video Capture Riser 40
Table 9-5 J6 Pinout Table for Video Capture Riser Module 41
Table 9-6 J7 Pinout for Video Capture Riser Module 41
Table 9-7 J9 Pinout for Video Capture Riser Module 41

1 • Introduction

1.1 Purpose of This Guide

This User's Guide for the G2 Graphics PMC Family provides information required to:

1. Confirm that the system into which it will be installed meets all requirements, prior to actual installation
2. Carry out the hardware installation
3. Test that the hardware installation has been successful
4. Provide *hardware* information that may be required during software development.

This guide augments the following G2 literature:

1. The G2 Graphics PMC Technical Data Sheet, which provides all pre-sales information required to confirm that the G2 Graphics PMC module will meet the user's needs
2. Software manuals available from ALT Software, required for installation and testing of the required drivers for certain OS's. These drivers are available separately from ALT Software.

This manual is for use with all members of the G2 Graphics PMC family: the G2 Basic, the G2 Dual and the G2 Plus.

It is also intended for use with the available G2 Riser Modules, and the G2 Transition Module, which are addressed in Chapter 9.

1.2 Overview of G2 Graphics PMC Family

The G2 Graphics Processor PMC family provides the powerful 3D graphics processing power of ATI's popular Mobility Radeon 9000 ('M9') chip, as used in today's highest-end notebook computers, on a PMC module available in three ruggedness levels.

The M9's internal processors run at 250 MHz, and provide separate concurrent pipeline engines for 2D processing, 3D processing, output processing, and video capture processing. The M9 provides 64 MBytes of 128-bit wide DDR video memory running at 200 MHz. Combined, this provides graphics power approaching that of high-end desktop workstations, all on a PMC module.

The G2 is available in three versions:

- G2 Basic - Optimized for single-display graphics-only applications
- G2 Dual – For Dual-Independent-Display graphics-only applications, or
- G2 Plus - For applications requiring up to two independent display outputs, and up to two channels of video capture plus overlay on screen capability.

All display outputs and the video inputs support a wide array of formats to ensure the G2 can support most applications 'out of the box'.

The G2 Family is available in three variations of ruggedization: commercial, extended-temperature, and conduction-cooled.

G2 Graphics PMC modules require separately-available software drivers, as described in a later section.

The following photographs show the G2 Basic and the G2 Plus PMC modules:

Figure 1-1 G2 Basic (Air-Cooled Version)

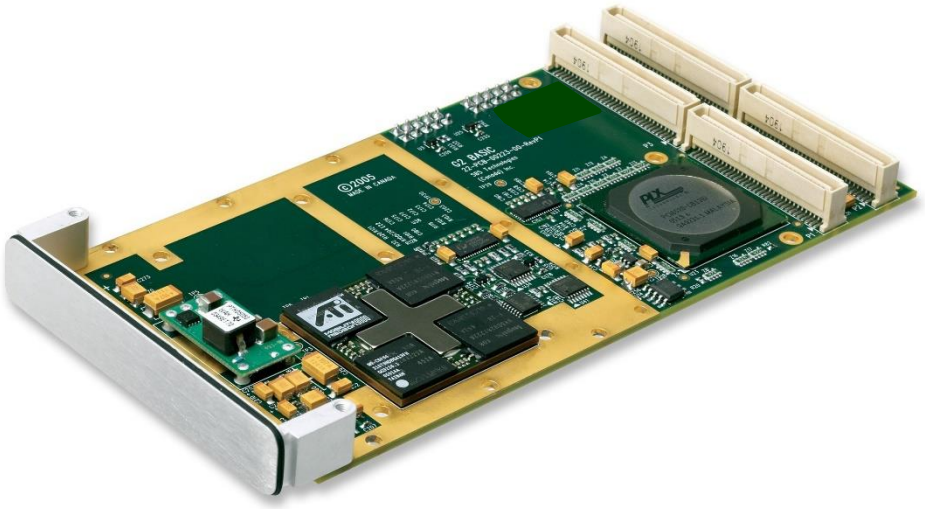
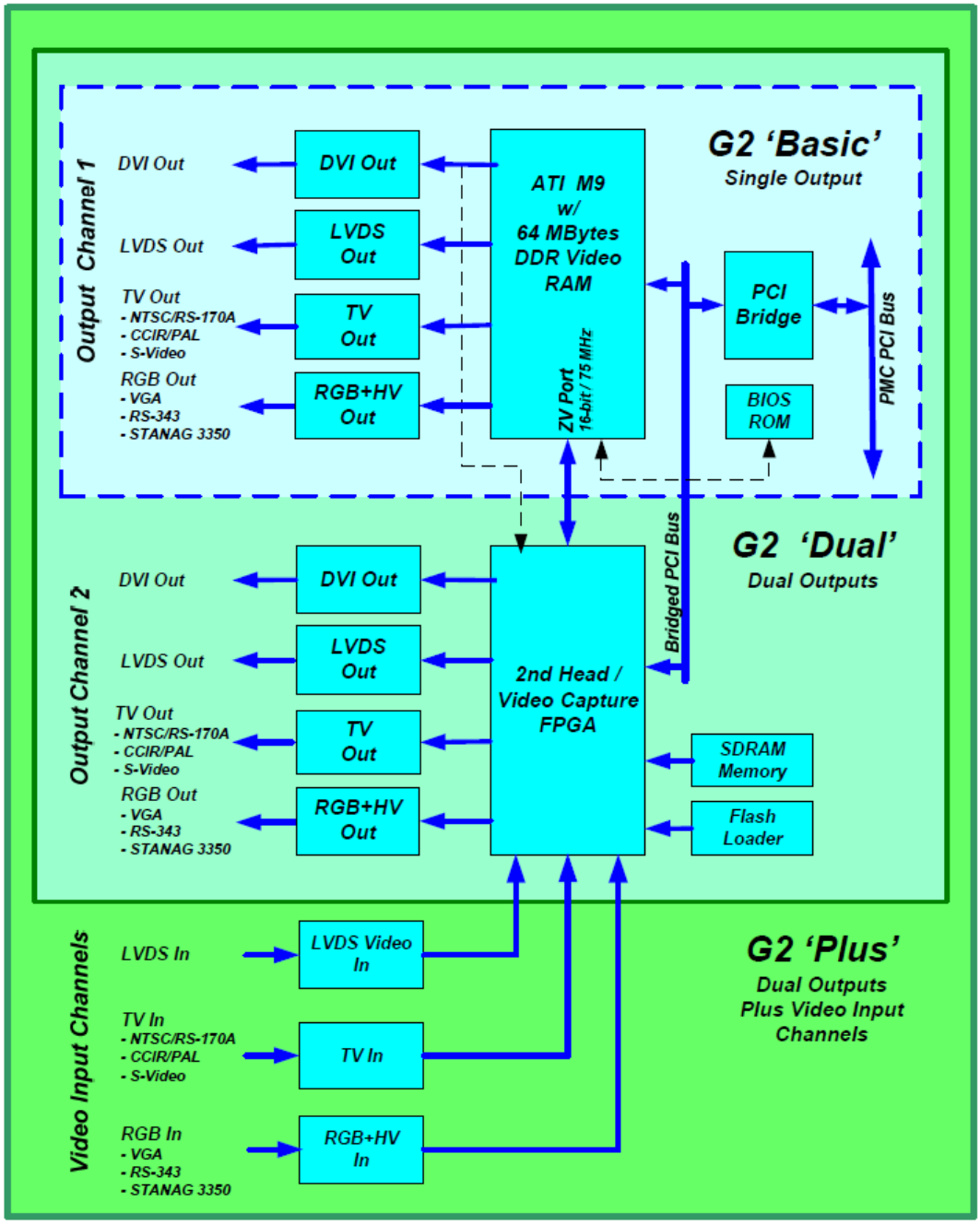


Figure 1-2 G2 Plus (Air-Cooled Version)



The following is a block diagram for all three members of the G2 Family:

Figure 1-3 G2 Family Block Diagram



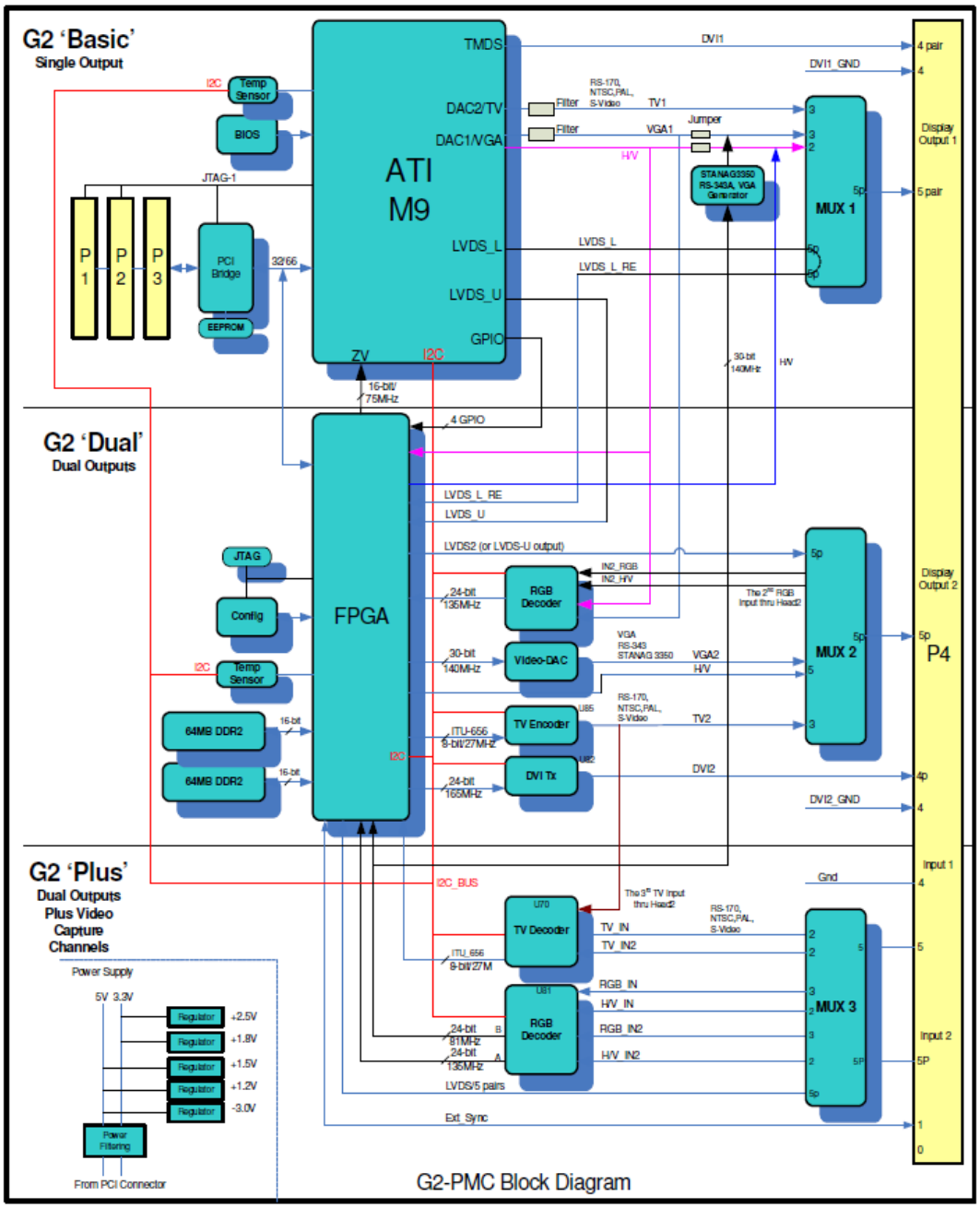
1.3 Specifications Reference

The specifications for the G2 Graphics PMC Family are provided in the companion G2 Graphics PMC Family Technical Data Sheet.

1.4 Block Diagram

The following provides a more detailed Block Diagram for the G2 Graphics PMC family:

Figure 1-4 G2 Family Detailed Block Diagram



1.5 Required Software Drivers

Complete driver software support and demonstration software is available as follows:

From ALT Software, *at Extra Cost*, for G2 Basic, Dual, and Plus:

1. VxWorks OpenGL Drivers for both PowerPC and Intel SBC's
2. Green Hills Integrity OpenGL and X11 Drivers for PowerPC SBC's
3. Windows and Linux OpenGL Drivers for Intel SBC's



NOTE

Note that not all Abaco SBCs are supported on all operating systems. Please contact Abaco for more details on specific SBC/G2 combinations and operating systems.

If you have not yet obtained these required drivers, please contact:

- For ALT drivers please visit http://www.altsoftware.com

Addition steps may be required to integrate the above drivers with your particular SBC. Please consult the documentation that came with your Abaco SBC for further information.

1.6 Related Documents

The following other G2 documentation is available:

G2 Graphics PMC Data Sheet: This provides a brief overview of key technical specifications

G2 Graphics PMC Technical Data Sheet: This provides complete technical specifications, including exact pin-out information.

1.7 Safety Notices

The following general safety precautions represent warnings of certain dangers of which Abaco Systems is aware. Failure to comply with these or with specific Warnings and/or Cautions elsewhere in this manual violates safety standards of design, manufacture and intended use of the equipment. Abaco Systems assumes no liability for the user's failure to comply with these requirements.

Also follow all warning instructions contained in associated system equipment manuals.



WARNING

Use extreme caution when handling, testing, and adjusting this equipment. This device may operate in an environment containing potentially dangerous voltages.

Ensure that all power to the system is removed before installing any device.

To minimize shock hazard, connect the equipment chassis and rack/enclosure to an electrical ground. If AC power is supplied to the rack/enclosure, the power jack and mating plug of the power cable must meet IEC safety standards.

1.7.1 Handling

Electronic assemblies use devices that are sensitive to static discharge. Observe anti-static procedures when handling these boards. All products should be in an anti-static plastic bag or conductive foam for storage or shipment. Work at an approved anti-static workstation when unpacking boards.

2 • Required Environment

2.1 General PMC Site Requirements

The PMC site for the G2 PMC module must allow for the fact that all four PMC connectors are installed, so that the carrier or SBC must be compatible with 1386.1 and allow for their presence. *Please consult Abaco for applications requiring deletion of PMC P3 connector, as is required for some SBC's.* The following sections indicate additional PMC site requirements.

2.2 Power Requirements

The power requirements for G2 Family PMC modules, for each of the power rails, are provided in the G2 Family Technical Data sheet.

2.3 Thermal/Cooling Requirements

The G2 Family dissipates considerable power, in excess of the usual 7.5 watt limit for PMC modules. Careful consideration must be given to the thermal design of systems using the G2. For details of thermal/cooling requirements for both air-cooled and conduction- cooled versions, please see the G2 Family Technical Data Sheet.

2.4 Signal Routing Requirements to Displays And Video Sources

Since all display output and video capture signaling are routed via PMC P4 to the carrier board and SBC and then to the backplane, care must be taken to ensure that:

a) All the required signals are conveyed to the backplane by the carrier or SBC. Not all carriers or SBC's convey all signals, so this must be checked on a pin by pin basis. The exact G2 Family pin-out is provided in the G2 Technical Data Sheet.

b) In addition, the routing of these signals must provide adequate signal integrity, in terms of both impedance discontinuities, signal delay times, cross-talk. This is especially critical for DVI outputs, where the signaling can reach 1.6 GHz, but needs to be resolved for all I/O. Please consult Abaco if assistance is required.

2.5 Software Drivers

To proceed with the installation, you will need:

1. The graphics software described in Chapter 4.

3 • Hardware Installation

3.1 Introduction

This section provides instructions for installing the G2 Graphics PMC module on the SBC or Carrier Board.

3.2 Installation Equipment Needed

The installation requires the following tools and supplies:

1. Torque screwdriver (40-90 in-oz capable) with Slotted and Phillips bits
2. Loctite 222 or similar (optional)
3. 1 mm thermal gap pad (optional)

3.3 Configuration Jumpers

There are no hardware configuration jumpers on G2 Graphics PMC modules. All configuration is done via software.

3.4 Installation

3.4.1 Air-Cooled Models

G2 Basic

Step 1 – Remove the Four Screws from the G2 Module

The G2 Basic Module delivered to the customer has 2 standoffs and 1 faceplate Bezel. Remove the 4 screws which are intended to attach the carrier board to the spacers and Bezel.

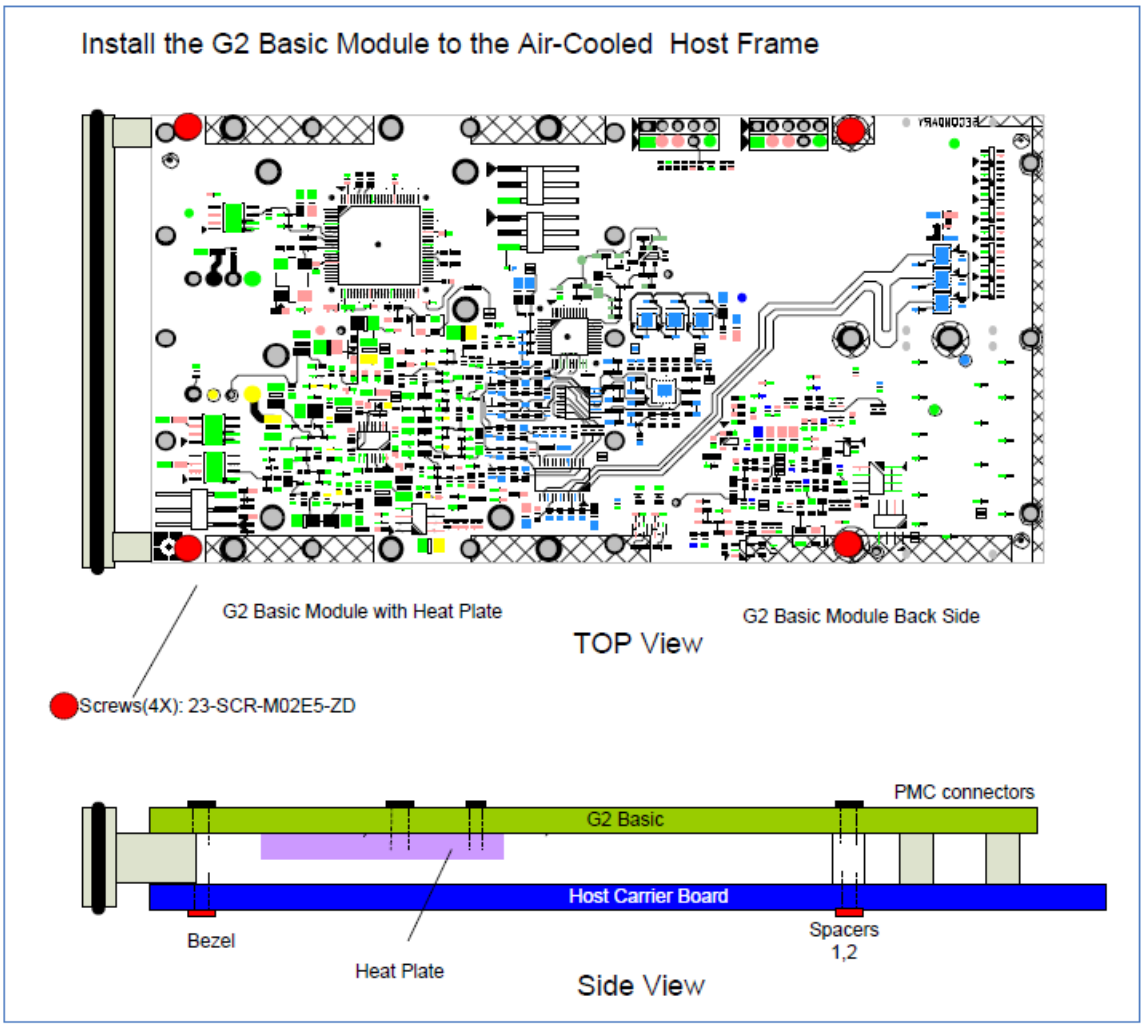
Step 2 – Install the G2 Module on the Carrier Board

Insert the G2 Module into the PMC slot in the carrier board, making sure the PMC connectors are properly positioned.

After applying a small amount of Loctite, install the four M2.5 Cheese Head screws (removed from G2 Module in Step 1) from the carrier side to the spacers and Bezel.

- The screw torque for the four screws which insert into the spacers from the carrier side should be 85 +/- 6 in-oz.

Figure 3-1 G2 Basic PMC Installation



G2 Dual and Plus

Step 1 – Remove the Four Screws from the G2 Module

The G2 Dual/Plus Module delivered to the customer has 2 standoffs and 1 faceplate Bezel. Remove the 4 screws which are intended to attach the carrier board to the spacers and Bezel.

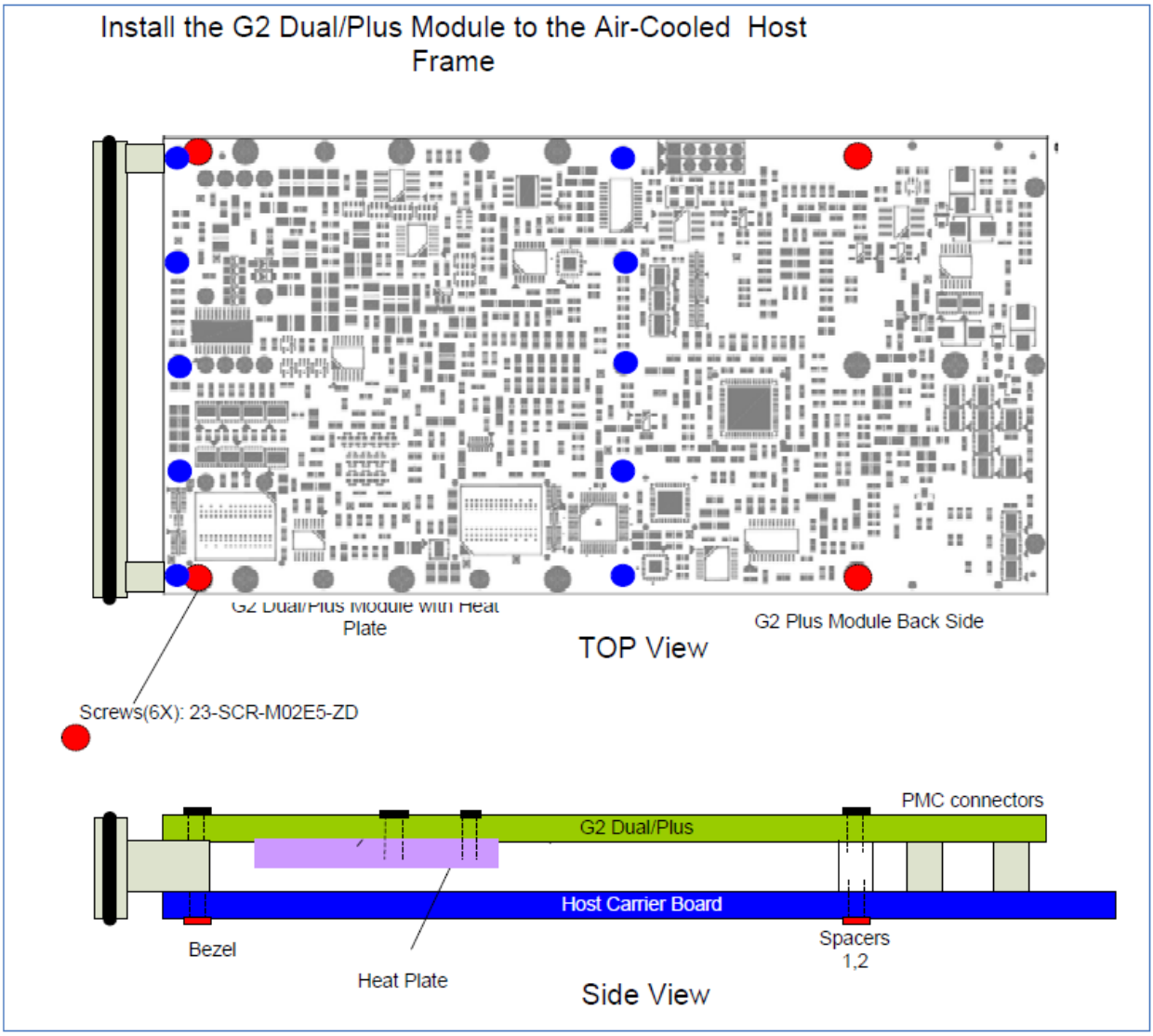
Step 2 – Install the G2 Module on the Carrier Board

Insert the G2 Module into the PMC slot in the carrier board, making sure the PMC connectors are properly positioned.

After applying a small amount of Loctite, install the four M2.5 Cheese Head screws (removed from G2 Module in Step 1) from the carrier side to the spacers and Bezel.

- The screw torque for the four screws which insert into the spacers from the carrier side should be 85 +/- 6 in-oz.

Figure 3-2 G2 Dual/Plus PMC Installation



3.4.2 Conduction-Cooled Models

G2 Basic

Step 1 – Remove the PMC Upper and Lower Heat Ribs from the Host Frame



If the conduction-cooled host board already has the upper and lower heat ribs, remove them, so as to be able to add the new upper and lower heat ribs dedicated to the G2 Basic PMC conduction-cooled board in the next step.

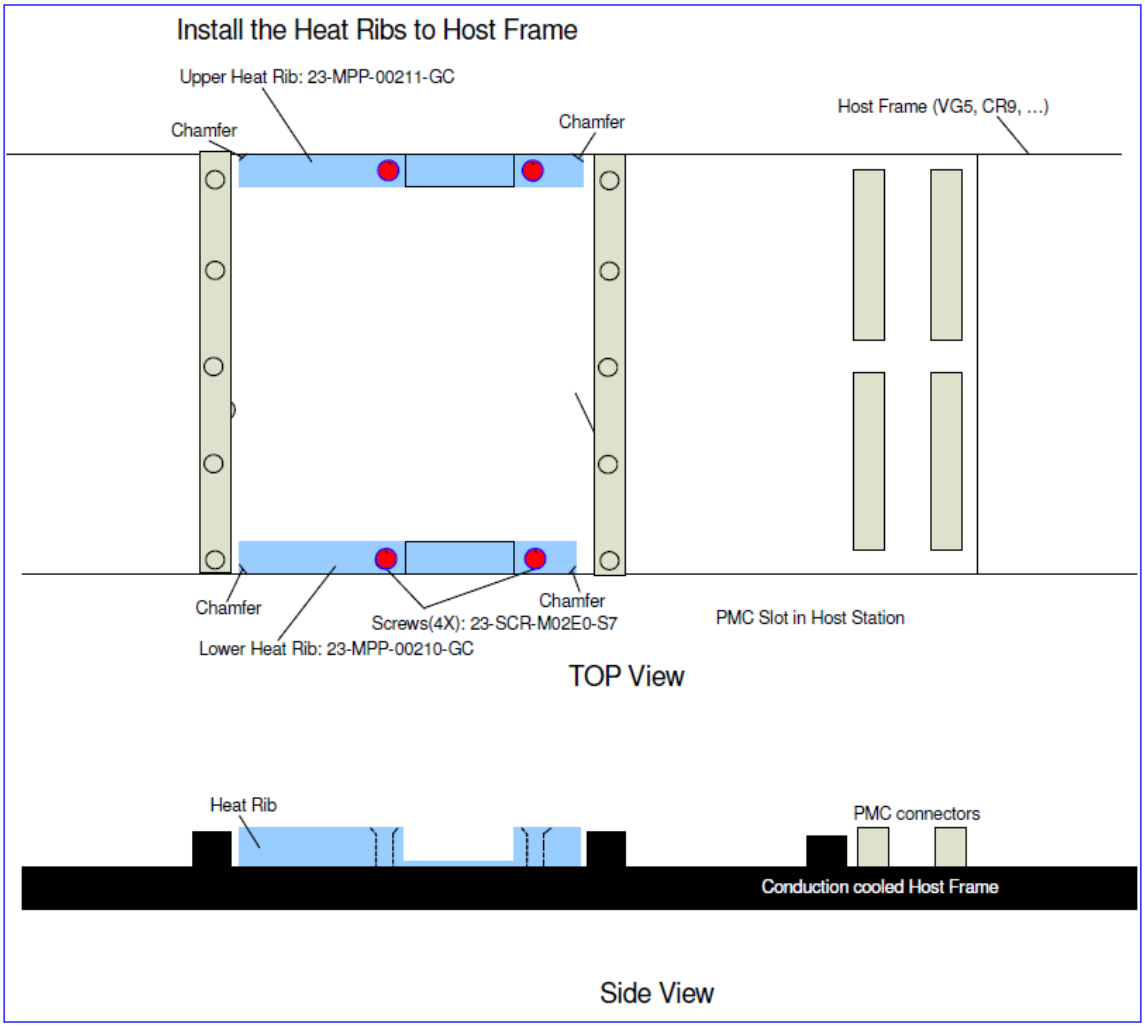
Step 2 – Install the New Upper and Lower Heat Ribs to the Host Frame



The upper and lower heat ribs and the flat head screws are included in the Conduction Cooled Mounting Hardware kit. These ribs fit many host cards, but in some cases a custom rib may be required.

- Position the upper and lower ribs as shown below. Note that the chamfer on each heat rib should face outward.
- After applying a small amount of Loctite, install the four M2 flathead screws. The Screw torque is dependent on the host frame material and should be obtained from the host card manufacturer. The torque should be the lesser of: torque specified by the host card and 42 +/- 3 in-oz.

Figure 3-3 Heat Rib Installation



NOTE

Be sure to use only the 7mm screws provided. Standard 8mm length screws could protrude through the carrier's cooling plate resulting in damage to any components beneath! Do not use the screws removed from the original heat ribs, as these may have a different head style and length.

Step 3 (Optional) – Install thermal gap pad, or some type of thermal interface material, between the Host Cooling Frame and the G2 Heat plate

For improved thermal performance, it may be desirable to install thermal gap pad between the G2 Heat plate and the Host frame. This material is not included in the Conduction Cooled Mounting Hardware kit. The spacing between the 2 plates is 0.8 mm.

Step 4 – Install the G2 Basic Module on the Host Frame



Insert the G2 Basic Module into the PMC slot in the host card, making sure the PMC connectors are properly positioned. The Screws are included in the Conduction Cooled Mounting Hardware kit.

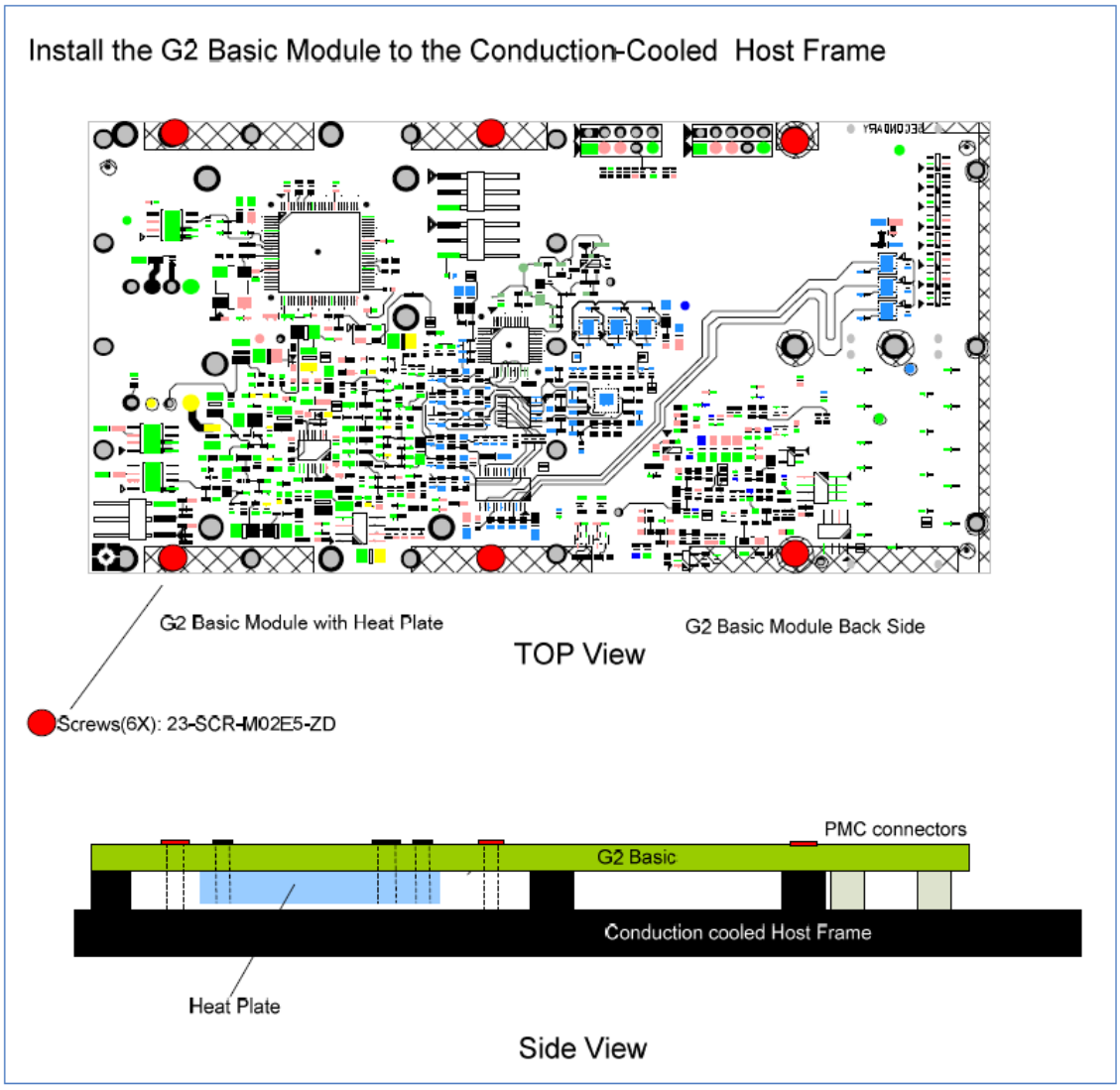
After applying a small amount of Loctite, install the six M2.5 Cheese Head screws as shown below.

- The Screw torque for the four screws which insert into the custom heat ribs should be 85 +/- 6 in-oz.
- The screw torque for the two screws which insert into the host card cooling frame is dependent on the host frame material and should be obtained from the host card manufacturer. The torque should be the *lesser* of: torque specified by the host card and 85 +/- 6 in-oz.

If applicable, after applying a small amount of Loctite, also install the ten M2 screws into the primary heat rails of the host card.

- The Screw torque is dependent on the host frame material and should be obtained from the host card manufacturer. The torque should be the *lesser* of: torque specified by the host card and 42 +/- 3 in-oz.

Figure 3-4 G2 Basic PMC Installation



G2 Dual and Plus

Step 1 – Remove the PMC Upper and Lower Heat Ribs from the Host Frame



If the conduction-cooled host board already has the upper and lower heat ribs, remove them, so as to be able to add the new upper and lower heat ribs dedicated to the G2 Dual/Plus PMC conduction-cooled board in the next step.

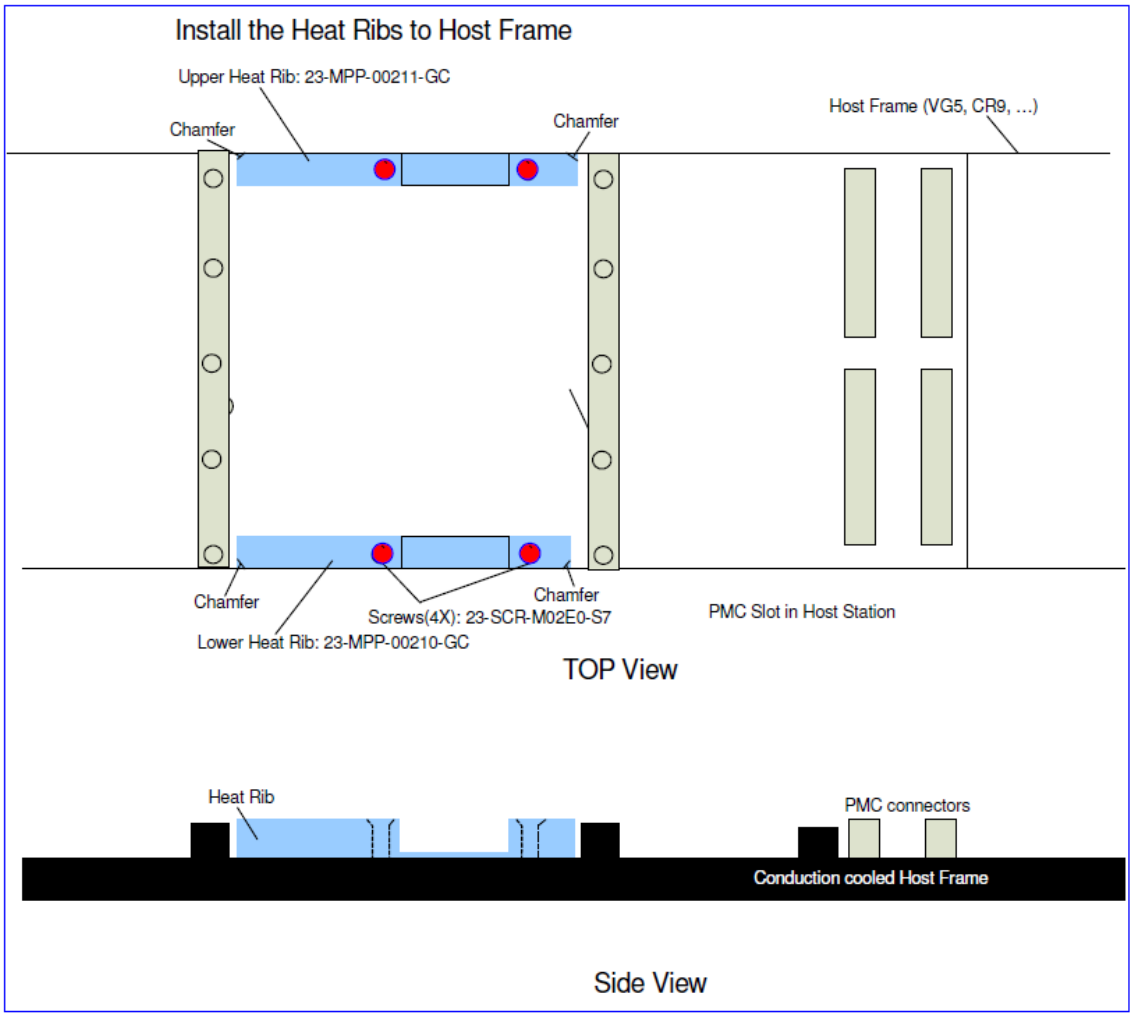
Step 2 – Install the New Upper and Lower Heat Ribs to the Host Frame



The upper and lower heat ribs, and the flat head screws are included in the Conduction Cooled Mounting Hardware kit. These ribs fit many host cards, but in some cases a custom rib may be required.

- Position the upper and lower ribs as shown below. Note that the chamfer on each heat rib should face outward.
- After applying a small amount of Loctite, install the four M2 flathead screws. The Screw torque is dependent on the host frame material and should be obtained from the host card manufacturer. The torque should be the lesser of: torque specified by the host card and 42 +/- 3 in-oz.

Figure 3-5 Heat Rib Installation



NOTE

Be sure to use only the 7mm screws provided. Standard 8mm length screws could protrude through the carrier's cooling plate resulting in damage to any components beneath! Do not use the screws removed from the original heat ribs, as these may have a different head style and length.

Step 3 (Optional) – Install thermal gap pad, or some type of thermal interface material, between the Host Cooling Frame and the G2 Heat plate

For improved thermal performance, it may be desirable to install thermal gap pad between the G2 Heat plate and the Host frame. This material is not included in the Conduction Cooled Mounting Hardware kit. The spacing between the 2 plates is 0.8 mm.

Step 4 – Install the G2 Dual/Plus Module on the Host Frame



Insert the G2 Plus Module into the PMC slot in the host card, making sure the PMC connectors are properly positioned. The Screws are included in the Conduction Cooled Mounting Hardware kit.

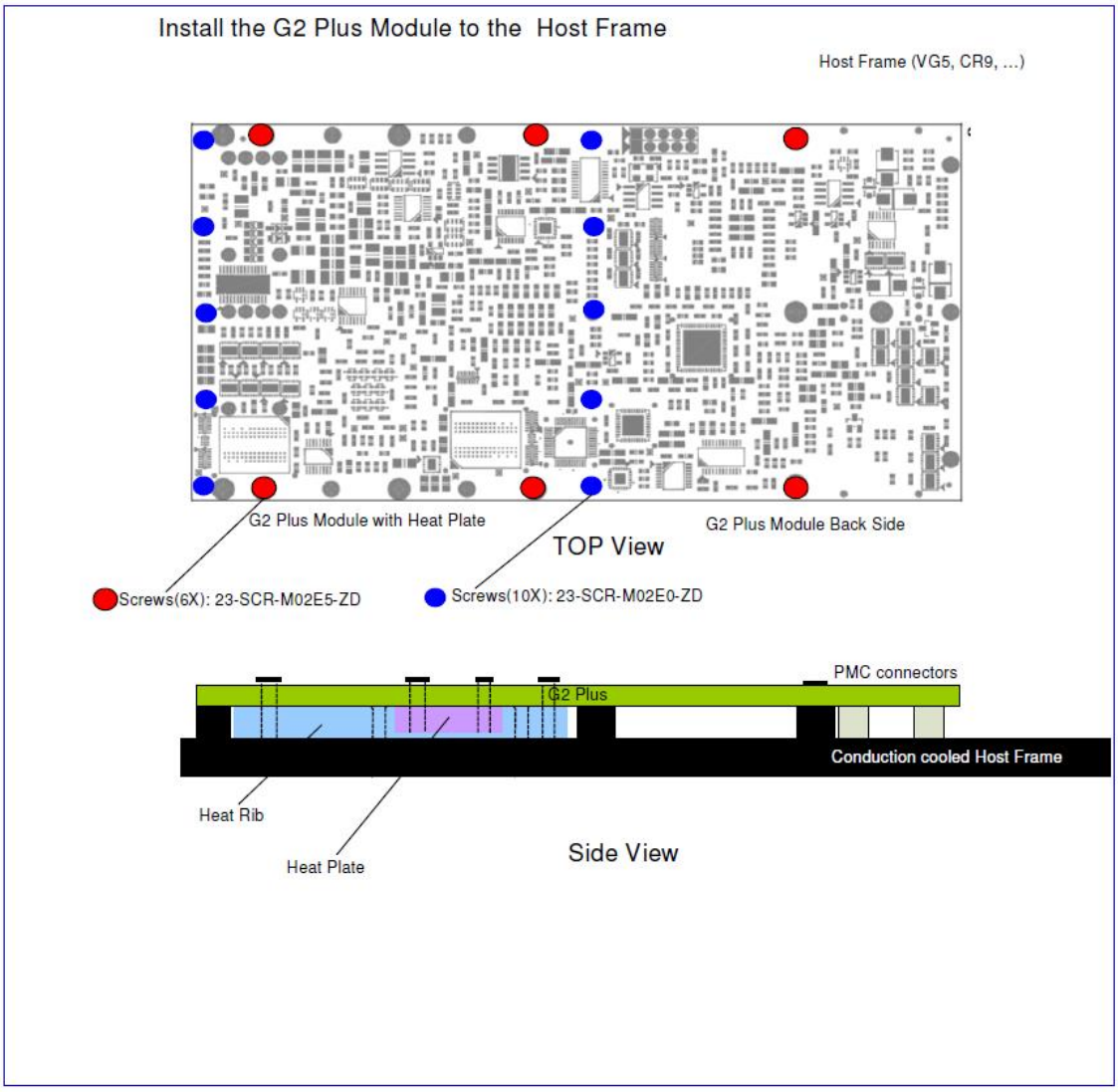
After applying a small amount of Loctite, install the six M2.5 Cheese Head screws as shown below.

- The Screw torque for the four screws which insert into the custom heat ribs should be 85 +/- 6 in-oz.
- The screw torque for the two screws which insert into the host card cooling frame is dependent on the host frame material and should be obtained from the host card manufacturer. The torque should be the *lesser* of: torque specified by the host card and 85 +/- 6 in-oz.

If applicable, after applying a small amount of Loctite, also install the ten M2 screws into the primary heat rails of the host card.

- The Screw torque is dependent on the host frame material and should be obtained from the host card manufacturer. The torque should be the *lesser* of: torque specified by the host card and 42 +/- 3 in-oz.

Figure 3-6 G2 PMC Installation



NOTE

Rarely, some host cards may not be threaded for the M2 screw size. Please consult Abaco for assistance in such a case.

3.5 Verifying Correct Installation

Once the hardware is installed on the board a preliminary set of tests can be performed to ensure that the board is seated correctly and visible on the PCI Bus.

Using a method appropriate for your target operating system, scan the PCI bus and confirm that the G2 Graphics PMC that you have installed is visible. The identity of the G2 Graphics PMC can be confirmed through the subsystem vendor and device IDs. A list of these G2 Graphics PMC IDs can be found in Appendix A – G2 PCI Subsystem Values.

If you wish to further verify the correct functioning of your G2 Dual or Plus Graphics PMC, and you have the software working as described in the ALT Software Manual, you may query the temperature of the board and confirm that it is close to ambient air temperature, as a good first check of correct operation. If this operates correctly, you may then run one of ALT Software's demo applications, to show correct display output operation to system display(s).

4 • Getting the Software Going

4.1 Introduction

Please refer to ALT software's documentation for instructions on how to install the software, and available functionality.

If you have any problems, support is available, through ALT Software with your ALT Software license purchase, or though Abaco Systems.

5 • Hardware Interfaces

5.1 Connectors

The G2 Family provides standard PMC connectors P1 to P4.

5.2 Connector Pin Assignments

G2 Graphics PMC family pin-outs are provided in the G2 Graphics PMC Technical Data Sheet.

5.3 PCI Bus Compatibility

5.3.1 General

The G2 Graphics PMC external interface is 64 bit PCI bus capable at running at speeds of up to 66MHz. Internally, the G2 operates on a 32 bit / 66 MHz bus. This means that full bandwidth to the G2's M9 is available when the G2 Graphics PMC is located on either a 32 bit / 66MHz or 64 bit / 33MHz system PCI bus.

5.4 Temperature Sensor

The G2 Family provides on-board temperature sensors that can be read via a software utility. Please consult Abaco regarding the availability of this software.

6 • Functional Blocks

6.1 ATI M9 GPU

The G2 Family uses the ATI Mobility Radeon 9000 (M9) Graphics Processor chip, with the following characteristics:

1. GPU Speed: 250 MHz (1.5 VDC core voltage)
2. PCI Bus Support: PCI 2.2
3. Memory: 64 MBytes Internal Memory, 128 bits wide, 200 MHz DDR
4. Internal Processors:

    i. *2D Acceleration Engine(Charisma Engine II)*
    A highly optimized 128-bit engine capable of processing multiple pixels per clock, including Bitblt, line drawing, polygon and rectangle fills, bit masking, monochrome expansion, panning and scrolling, and scissoring. Acceleration in 8/15/16/32 bpp modes. Hardware cursor support up to 64 X 64 X 32 bpp.

    ii. *3D Acceleration Engine(Tapestry Engine II)*
    Complete 3D primitive support of points, lines, triangles, strips, fans, quadrilaterals, and BLT's with Z compare, with Gourad and specular shading. A third generation rendering engine that supports 4 pixels per clock cycle.

    Texture mapping features include support of multi-texturing via 12 texel read and 16 blend operations per pixel in a single pass. This allows effects such as: light and gloss maps, reflections, shadows, spotlights, and texture morphing. Support of arbitrary texture sizes up to 2048 X 2048 with no limitation on texture format or location (i.e. one texture may reside in PC memory and the other in frame buffer memory).

    iii. *Video Processing Engine (Video Immersion II)*
    Provides advanced de-interlacing and frame rate conversion algorithms, independent gamma control for the video overlay, and other advanced video processing features.

For more information and manuals for the M9 chip, consult Abaco for details about how to obtain, under NDA to ATI, the M9 Manual Set.

6.2 Second Display Output Components (G2 Dual and Plus)

In order to provide true dual outputs, the G2 Dual and Plus reformat the output data stream from the ATI M9's second output into the desired second display format: DVI, RGB (VGA, RS-343, or STANAG).

It does this reformatting by:

a) First capturing data from the ATI M9's LVDS output (if not used for First Display output) or from the ATI M9's VGA output (if LVDS *is* used for First Display output).

b) Routing this data through the FPGA on the G2 Dual or Plus.

c) Resending the data from the FPGA in the selected format by means of the selected output chip: DVI output, RGB output, TV output. If the second output is selected to be LVDS, this output is provided directly from the FPGA.

Even though the output *format* (e.g. from LVDS to VGA) is changed through this process, the screen resolution and refresh rates are unchanged from that provided by the ATI M9 chip. Software API calls that change resolution and/or refresh rates are directed to both the ATI M9 chip and the FPGA, to ensure this reformatting happens correctly for all settings.

6.3 Video Capture Components (G2 Plus)

The G2 Plus provides video capture for TV, RGB (VGA, RS-343, STANAG), and LVDS video types. Two of these inputs may be streamed to the M9 as selected under S/W API control.

All captured input streams are routed through the G2 Plus's FPGA:

- LVDS capture is accomplished directly by the FPGA.
- TV and RGB capture are accomplished by dedicated chips that perform A to D conversion, and their digital outputs are then routed to the FPGA.

From the FPGA, under software API control, one captured video stream may be routed to the ATI M9's 'ZV' port, and the other to the ATI M9's PCI bus input via the G2's internal PCI bus.

Please see the G2 Family Technical Data Sheet for recommendations as to which stream to use for each input type and the manual for the S/W drivers for information as to how to activate desired video capture functionality.

7 • Resources

7.1 Memory and I/O Address Mapping

7.1.1 PCI Buses

The PCI resources required for the G2 Graphics PMC are documented in the G2 Graphics PMC Technical Data Sheet.

8 • Specifications

As mentioned, full detailed specifications for the G2 Graphics PMC family are provided in the G2 Graphics PMC Technical Data Sheet.

9 • Riser Modules

9.1 Introduction

In order to allow use of the G2 Family before a customer's backplane is ready, Abaco has available G2 Riser modules, which allow front panel access to all display output signals, and all video capture input signals.

The following shows the available three modules, shown with a G2 Plus PMC module:

Figure 9-1 G2 Riser Modules Shown with G2 Plus



The following picture shows these riser modules in use on a typical single-board computer:

Figure 9-2 G2 Riser Modules in Use with G2 Plus



As can be seen, the desired Riser Modules (one, two, or three as required) are mounted on the SBC, and then the G2 is mounted on top of these.

The risers simply divert the I/O display/video signals appearing on the G2's PMC P4 connector to the front panel connectors, and simply pass-through the PMC P1-P3 signals untouched.

The three available riser modules are:

1. **Display Output 1 Riser**: Routes all G2 Display Output 1 signals to Front Panel

2. **Display Output 2 Riser:** Routes all G2 (Dual and Plus) Display Output 2 signals to Front Panel

3. **Video Capture Input Riser:** Routes all G2 (Plus) video Capture Signals to the Front Panel.

The modules are designed to be used either individually or in combination, depending on which signals need to be routed to the front panel. All other signals are passed through.

The Video Capture module should be mounted next to the SBC for correct S-Video functionality. Other than this, the order of mounting is not critical.

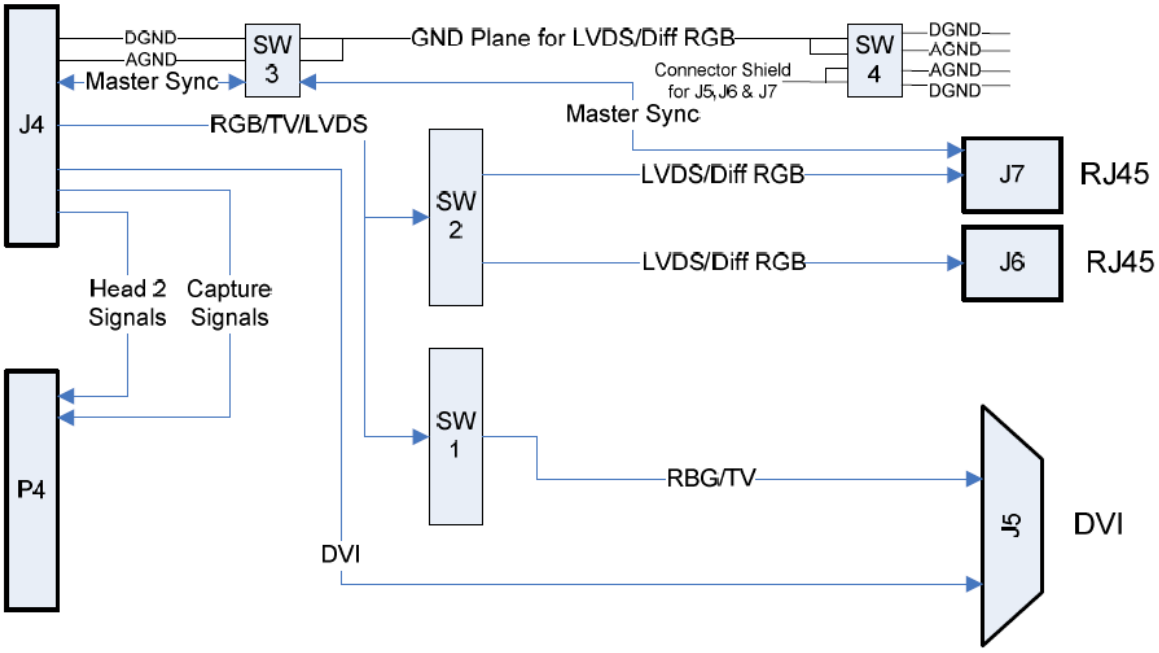
9.2 Display Output 1 and Display Output 2 Riser Modules

The Display Output 1 and Display Output 2 Riser Modules have identical functionality, configuration modes and connector pin outs. The only difference is which display head is routed to the connectors.

9.2.1 Functional Diagram

The following shows the overall function of these two riser modules:

Figure 9-3 Display Output Riser Modules Block Diagram



9.2.2 Mode Configuration

These two Riser modules provide switches to allow selection of signals to the appropriate front panel connector. The following table shows required switch settings for each output type:

Figure 9-4 Display Output Riser Module – Switch Settings

	SW1	SW2	SW3				SW4			
Mode	All	All	1	2	3	4	1	2	3	4
LVDS	off	on			on	off	off	on		
RGB Diff	off	on			off	on	on	off		
RGB SE	on	off			off	on	on	off		
TV	on	off			off	on	on	off		
Master SYNC Off			off							
Master SYNC RJ45			on							
Con Shield ChaGND									off	off
Con Shield GND									on	off
Con Shield AGND									off	on

9.2.3 Connector Pin Out

The following tables show the exact pin-outs on the front panel J5, J6, and J7 connectors for these modules.

The DVI pin-out complies with DVI 1.0, so that standard DVI monitor cables may be used. (Please note that the G2 does not support DVI 'Plug and Play' functionality.)

Table 9-1 J5 Pinout

	Modes			
J5	DVI	RGB SE /RS343	S-Video	CVBS
1	DV(2)-			
2	DV(2)+			
3	DV(2) Shield			
4				
5				
6				
7				
8		V-Sync		
9	DV(1)-			
10	DV(1)+			
11	DV(1/3) Shield			
12	DV(3)-			
13	DV(3)+			
14				
15		DGND		
16				
17	DV(0)-			
18	DV(0)+			
19	DV(0) Shied			
20				

	Modes			
J5	DVI	RGB SE /RS343	S-Video	CVBS
21				
22	DV(clk) Shield			
23	DV(clk)+			
24	DV(clk)-			
C1		Red	Y (Luminance)	
C2		Green	C (Chrominance)	
C3		Blue		TV
C4		H-Sync		
C5		AGND		

Figure 9-5 J6 Pinout

	Modes	
J6	RGB Diff	LVDS
1	H-Sync+	LVDS0+
2	H-Sync-	LVDS0-
3	Red+	LVDS1+
4	Green+	LVDS2+
5	Green-	LVDS2-
6	Red-	LVDS1-
7	Blue+	CLK+
8	Blue-	CLK-

Table 9-2 J7 Pinout

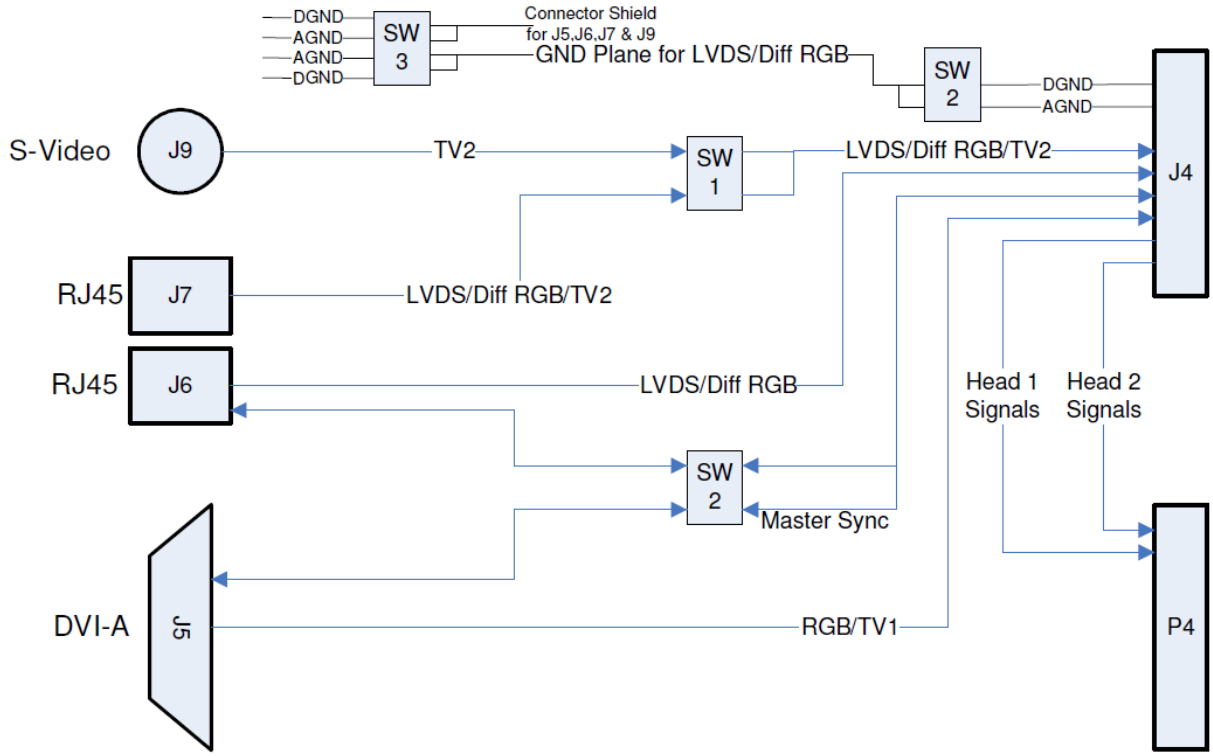
	Modes	
J7	RGB Diff	LVDS
1	3.3V	
2	DGND	
3	Signal Reference Ground	
4	V-Sync+	LVDS3+
5	V-Sync-	LVDS3-
6	Signal Reference Ground	
7	SYNC	
8	5.0V	

9.3 G2 Video Capture Riser Module

9.3.1 Functional Diagram

The following shows the overall function of the G2 Video Capture Riser Module:

Figure 9-6 G2 Video Capture Riser Module – Block Diagram



9.3.2 Mode Configuration

The following table shows the switch settings to correctly route signaling for the desired capture input types:

Table 9-3 Video Capture Module – Switch Settings

	SW1				SW2				SW3			
Mode	1	2	3	4	1	2	3	4	1	2	3	4
LVDS	off	on	off	on			on	off	off	on		
RGB Diff	off	on	off	on			off	on	on	off		
RGB SE	Always Active											
TV1	Always Active											
TV2 - RJ45	off	on	off	on			off	on	on	off		
TV2 - S-Video	on	off	on	off			off	on	on	off		
Master SYNC Off					off	off						
Master SYNC RJ45					off	on						
Master SYNC DVI					on	off						
Con Shield ChaGND											off	off
Con Shield GND											on	off
Con Shield AGND											off	on

The last three rows of the table, showing switch settings for the connector shields, needs some explanation. All of the connector shields on the risers are connected to a separate chassis ground. Chassis ground between the risers are connected through the board to board standoffs and face plates. If the risers are being used in an environment where at least one of the faceplates is not in contact with a chassis

ground carrier face plate then the connector shields will be floating. The switch settings on the risers allow you to connect the connector shields to either digital ground (GND) or analog ground (AGND) to prevent floating.

The three Master Sync rows in the table refer to the optional G2 feature to provide frame sync output, or input, to/from external systems. If this optional feature is not used, these switch settings are immaterial.

9.3.3 Connector Pin Outs

The following tables provide pin-outs for J5, J6, J7 and J9 on the G2 Video Capture Riser Module:

Table 9-4 J5 Pinout Table for Video Capture Riser

	Modes		
J5	RGB SE/RS343	S-Video1	CVBS1
1			
2			
3			
4			
5			
6			
7			
8	V-Sync		
9			
10			
11			
12			
13			
14			
15	DGND		
16			
17			
18			
19			
20			
21			
22			
23			
24			
C1	Red	Y (Luminance)	TV1
C2	Green	C (Chrominance)	
C3	Blue		
C4	H-Sync		
C5	AGND		

Table 9-5 J6 Pinout Table for Video Capture Riser Module

	Modes			
J6	RGB Diff	LVDS	S-Video2	CVBS2
1	H-Sync+	LVDS0+		
2	H-Sync-	LVDS0-		
3	Red+	LVDS1+	Y (Luminance)	TV2
4	Green+	LVDS2+	C (Chrominance)	
5	Green-	LVDS2-		
6	Red-	LVDS1-		
7	Blue+	CLK+		
8	Blue-	CLK-		

Table 9-6 J7 Pinout for Video Capture Riser Module

Modes		
J7	RGB Diff	LVDS
1	3.3V	
2	DGND	
3	Signal Reference Ground	
4	V-Sync+	LVDS3+
5	V-Sync-	LVDS3-
6	Signal Reference Ground	
7	SYNC	
8	5.0V	

Table 9-7 J9 Pinout for Video Capture Riser Module

Modes		
J9	S-Video2	CVBS2
1	AGND	
2	AGND	
3	C (Chrominance)	
4	Y (Luminance)	TV2
Shell	AGND	

9.4 Cabling

Pacific Custom Cable has many cables that allow easy access to signals from our boards. www.pacificcable.com

DVIIY-1	DVI-I to HD15 Female (VGA) / DVI-D (Single Link) Female - 1 Ft. Analog and Digital Y Splitter
DVIBNC-2	DVI-A Male - 5 BNC Male 2 Meter (6 Ft. 6 In.) Analog
EX18-6	VGA (HD15 Male To 5 BNC Male) R,G,B,V,H 6 Ft.
VIHD15	DVI-A Male - HD15 Female VGA Adapter Analog

A • G2 PCI Subsystem Values

The following is a list of valid PCI subsystem IDs for the G2 Graphics PMC family. If your PMC does not conform to one of these IDs, and you have not purchased a custom variant, please contact Abaco Systems.

G2 Graphics PMC Name	Subsystem Vendor ID	Subsystem Device ID
G2 Basic	**0x1775**	**0x0800***
G2 Basic	**0x1775**	**0x0801**
G2 Basic	**0x1775**	**0x0802**
G2 Dual	**0x1775**	**0x0810***
G2 Dual	**0x1775**	**0x0811***
G2 Plus	**0x1775**	**0x0820***
G2 Plus	**0x1775**	**0x0821***

* Note: Last digit varies, depending on board revision level.

© 2018 Abaco Systems, Inc.
All rights reserved.

* indicates a trademark of Abaco Systems, Inc. and/or its affiliates. All other trademarks are the property of their respective owners.

Confidential Information - This document contains Confidential/Proprietary Information of Abaco Systems, Inc. and/or its suppliers or vendors. Distribution or reproduction prohibited without permission.

THIS DOCUMENT AND ITS CONTENTS ARE PROVIDED "AS IS", WITH NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, WHETHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF DESIGN, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. ALL OTHER LIABILITY ARISING FROM RELIANCE ON ANY INFORMATION CONTAINED HEREIN IS EXPRESSLY DISCLAIMED.

Abaco Systems Information Centers

Americas:
1-866-652-2226 (866-OK-ABACO)
or 1-256-880-0444 (International)

Europe, Middle East and Africa:
+44 (0)1327 359444

Additional Resources

For more information, please visit the Abaco Systems web site at:

www.abaco.com

Publication No. G2_PMC_Family_HRM Rev. A

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP