

**Intel®
945(GM/GME)/915(GM/GME)/
855(GM/GME)/852(GM/GME)
Chipsets
VGA Port Always Enabled Hardware
Workaround**

White Paper

June 2007

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Revision History

Rev.	Description	Date
003	Modified for supporting 945GME and 915GME	June 2007
002	Added workarounds for 945, 852GM and 855GME chipsets	May 2006
001	Initial public release	April 2006

1 *Introduction*

1.1 **Purpose**

If a board containing the Intel® 945(GM/GME) Express Chipset, Intel® 915(GM/GME) Express Chipset, Intel® 855(GM/GME) chipset, or the Intel® 852(GM/GME) Chipset is booted up without a MONITOR attached, the MONITOR display will be disabled even if a MONITOR is attached after boot up.

This White Paper explains how to work around this problem so that a MONITOR can be enabled after boot up, which is necessary for applications which use the plug-and-play feature.

1.2 **Scope**

This paper is targeted for those who design for the 945(GM/GME)/915(GM/GME)/855(GM/GME)/852(GM/GME) Chipsets with the MONITOR plug-and-play feature.

2 ***Problem Description***

In some embedded applications, a MONITOR may be attached to the system after the boot up process has completed. When this occurs, the system boots up without the MONITOR attached during the POST and the VBIOS will disable the MONITOR output.

Under this condition, the MONITOR display will not work and the system will need to be rebooted with the MONITOR attached to enable the display.

The problem originates from the VBIOS of the Intel® Extreme Graphics Driver, which disables the MONITOR output if a MONITOR is not detected during POST.

3 ***Description of Hardware Workaround***

The Intel® 945(GM/GME)/915(GM/GME)/855(GM/GME)/852(GM/GME) Chipsets detect the presence of a MONITOR during POST by detecting 75 ohm pull-downs on the R/G/B signals located inside the MONITOR. These 75 ohm pull-downs near the Chipsets will change the equivalent resistance from 75 ohm to 37.5 ohm, and also change the DAC current of the chipset.

The 945(GM/GME)/915(GM/GME)/855(GM/GME)/852(GM/GME) will notify the VBIOS of the presence of the MONITOR by sensing whether the DAC current is changed. Based on the described MONITOR detection principle, a hardware workaround can be derived to tell the VBIOS of the Intel® Extreme Graphics Driver that the MONITOR is present even if it is unattached.

4 *Schematic of Hardware Workaround*

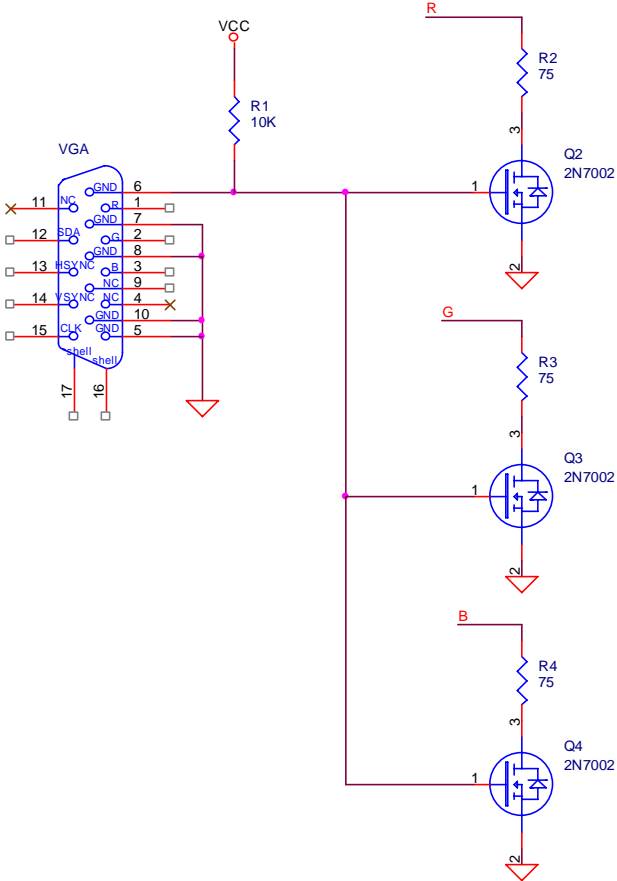
Note: This workaround is only necessary for platforms which use the Intel® Extreme Graphics Driver/VBIOS. This workaround is not necessary for platforms which use the Intel® Embedded Graphics Driver/VBIOS.

The workaround is accomplished by generating a 75 ohm pull-down enable/disable circuit on the board to tell the MONITOR detection of the POST that there is a MONITOR present.

The 75 ohm pull-downs would be enabled while the MONITOR is unattached, however, these 75 ohm pull-downs would be disabled while the MONITOR is attached.

A reference schematic is shown in Figure 1.

Figure 1 Intel® 945(GM/GME)/915(GM/GME)/855(GM/GME)/852(GM/GME) Chipsets Reference Schematic



NOTES:

1. V_{CC} needs to be larger than NMOS VGS turn on voltage.