AMD M690T/M690E Macrovision FAQ Technical Bulletin

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Trademarks

Revision History

Date	Revision	Description
August 29, 2007	A	Initial Release.

Chapter 1 Introduction

This document provides answers to Frequently Asked Questions (FAQs) regarding the AMD M690T and M690E Integrated Graphics Processors (IGPs) support for Macrovision technology.

1.1 Macrovision Overview

Macrovision, first and foremost, is a company that sells copy protection products primarily IP and software. The company has been public since 1997 and its web site is *http://www.macrovision.com*.

Macrovision created its copy prevention technology for analog TV output signals approximately 10 years ago. The company and the technology share the same name. Due to the proprietary nature of Macrovision, the details of how the algorithm works cannot be discussed in this bulletin. Suffice it to say that Macrovision is not designed to prevent a copy or recording of analog content, but its purpose is to degrade the copied content quality with distortion patterns so badly that the end user deems it unwatchable during playback.

Degradation of the copied analog signal is achieved by the TV signal transmitting device (encoder or graphics device) planting various components within the off-screen range (referred to the horizontal blanking interval and vertical blanking interval). Planting these components within the signal should not in any way degrade the live playback of the original signal on the TV, but it should render copied content unwatchable.

Macrovision is implemented in two ways: either physically recorded directly on the tape (as with VHS) or created on playback by a chip in the player (as with DVDs) or the digital cable/satellite box.

There are four ways Macrovision can distort the copied TV signal:

- AGC (Automatic Gain Control) pulse cycling,
- sync amplitude reduction,
- colorstriping, and
- end-of-field back-porch pulses.

Various DVD players, DVD discs, and VCRs turn on all of these anti-copy components and some choose just a subset of them. Regardless of what is enabled, all of these artifacts are inserted into pre-defined regions of the non-displayed blanking area. Macrovision's two most common components are illustrated in the circled and boxed regions in Figure 1 on page 6. The insertion of extra pulses causes the automatic gain control on the recording VCR to compensate for the varying strength. This makes the recorded picture noisy, unstable, and wildly changes brightness levels rendering the image unwatchable. The addition of colorstripes or rapidly modulated colorburst signals creates horizontal stripes within the viewable area of the TV screen. No adjustment of the TV controls will eliminate this and corruption of the copied content has been achieved.

Figure 1 was taken from a professional studio-quality TV which had been placed into a horizontal/vertical delay mode so it shows both the active region (colorbar test pattern) and the blanking area (black, gray, and green region shaped like a cross). Both of the aforementioned Macrovision technologies – AGC pulses (in white) and colorstripes (jaggies in the green region) can be seen visually.

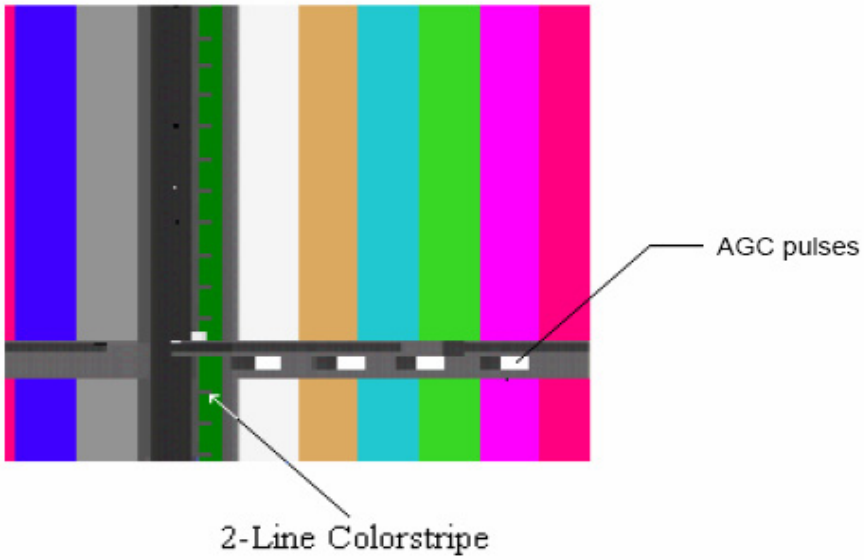

Figure 1. NTSC Output from Original Signal on a professional TV in H/V Delay Mode - AGC and Colorstriping Macrovision components On

Chapter 2 FAQs

The FAQs are not listed in any particular order. Table 1 provides a summary of the FAQs. A detailed description of each FAQ and its answer follow.

Table 1. FAQ Summary List

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FAQ No.	FAQ	Page Reference
18	There are multiple standard definition analog formats in use today such as NTSC, PAL, SECAM, and R/G/B/PAL SCART. Is the M690T Macrovision capability able to copy protect all the different SDTV formats?	13
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20	Can Macrovision's AGC bright pulses enabled by the M690T damage my equipment?	13
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1. Where/how can I obtain a Macrovision license?

To obtain a license, go to:
http://www.macrovision.com/company/contact_us.htm

Make sure to enter "ACP" (Analog Copy Protection) in the "Product Interest" field.

System makers that wish to purchase the M690T chipset from AMD or its authorized distributors must obtain a Macrovision license, or be otherwise authorized by Macrovision to purchase Macrovision-enabled technology.

2. How can I learn more about the Macrovision technology?

The following documents detail the components of the Macrovision process:

- Specifications of the Macrovision Antitaping Process for Digital Platforms, Revision 7.01, September 6, 1996.
- Definition of the Default Settings of the Macrovision Antitaping Process for DVD
- Products, Revision 1.01, December 30, 1997.
- Specifications of the Macrovision Copy Protection Process for Authorized Component Suppliers, Revision 7.1.L1, September 15, 1998.
- Specification of the Macrovision AGC Copy Protection Waveforms for DVD Applications with 525p (480p) Progressive Scan Outputs, Revision 1.03, December 22, 1999.

Consult Macrovision to obtain the most updated version of these documents and any other relevant documents at:
http://www.macrovision.com

Macrovision Corporation
2830 De La Cruz Boulevard
Santa Clara, CA 95050 USA
Phone: 408-562-8400

3. How much are the royalty fees for products with Macrovision?

Contact Macrovision for specific rates and quotes: *http://www.macrovision.com*

4. How can an AMD salesperson, field applications engineer, or distributor determine if a potential customer is permitted to purchase the M690T from AMD or its authorized distributors?

In order to purchase the M690T from AMD, the customer must be a Macrovision Authorized Buyer, or otherwise authorized by Macrovision to purchase Macrovision-enabled technology. To determine if a customer is so authorized, contact:
Bob Lurvey (robert.lurvey@amd.com)
(512)602-7594.

5. What are the feature differences between the M690E and M690T?

The M690T and M690E are form, fit, and functionally the same device except the M690E has had the Macrovision encoding features disabled in hardware and does not provide any sort of analog TV output. On the other hand, the M690T does provide TV outputs and includes Macrovision analog TV copy protection.

The table and figure below summarizes the differences between the M690T and M690E in terms of analog TV and VGA/CRT display outputs.

Analog Output Feature	M690T	M690E
Composite NTSC/PAL TV Port	Available	Not Available
S-Video (Y/C) NTSC/PAL TV Port	Available	Not Available
Component 480i (YCRCB/RGB) TV Port	Available	Not Available
Component HDTV (YPRPB) TV Port	Available	Not Available
Standard VGA/CRT (R/G/B/H/V) Port	Available	Available
Note: *AMD customers MUST have a Macrovision license in place, or otherwise be authorized by Macrovision to purchase Macrovision-enabled technology, before AMD can sell them any M690T chips. M690E devices can be obtained without a Macrovision license.*		

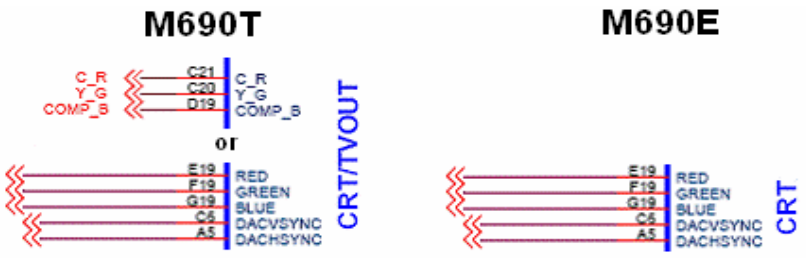

Figure 2. Analog Display output Signals Enabled with M690T and M690E

The only other difference between the M690T and M690E concerns support for a second TMDS/DVI digital output. Both the M690T and M690E provide a primary TMDS/DVI output via its x8 PCI Express® port. However, only the M690E supports a second TMDS/DVI output via its LVTM interface. The net result of this is that the M690T is not able to support two single-link DVI-D outputs without connecting an external DVI transmitter device to the DVO port. The M690E can provide two single-link DVI-D outputs using its two on-chip integrated TMDS transmitters.

6. Does the M690T support Macrovision?

Yes. The M690T supports Macrovision. The Macrovision Corporation has certified the M690T as Macrovision compliant.

7. Does the M690E support Macrovision?

No. The M690E has had the Macrovision encoding features disabled in hardware and does not provide any sort of TV output. As a result, the M690E cannot support Macrovision.

8. I know that the M690T is designed to produce the Macrovision 7.1 anticopy algorithm, but does it support Macrovision 6.1 as well?

Yes. The M690T can be programmed to generate waveforms with the older Macrovision 6.1 process or newer 7.1 process. Since version 6.1 is unlikely to be required in new production systems, the emphasis for AMD has been on providing Macrovision 7.1 content protection. Contact your local AMD field applications engineer and provide a description of your end system and technical requirements if Macrovision 6.1 needs to be implemented within the M690T's TV outputs.

9. I am considering applying for, or have applied for, a Macrovision license but it is not approved yet, can I still obtain samples of the M690T for prototyping my system?

Yes. AMD may provide a limited quantity of Macrovision-enabled M690T devices to allow customers to build prototype systems and evaluate the features and performance of AMD's products. In exchange, we require that prior to delivery of M690T devices that each prospective customer sign and return an Agreement Letter that acknowledges that it will use these devices, and the resulting platforms, for engineering and evaluation purposes only and that it will not resell or otherwise distribute the devices or the resulting platforms.

This Macrovision sample Agreement Letter can be obtained from your local AMD salesperson, distributor, or field applications engineer.

10. If I do not have a Macrovision license (and am not otherwise authorized by Macrovision to purchase Macrovision-enabled technology) and require TV output for my system, can I purchase the M690T?

No. If you do not have a Macrovision license (or are not otherwise authorized by Macrovision to purchase Macrovision-enabled technology) and need TV output, you cannot purchase the M690T from AMD or its authorized distributors.

11. My System requires the M690T/M690E's on-chip D-A converters to be used for a set of R/G/B analog VGA outputs, is there any way I can still obtain a set of TV outputs?

Yes, but dual TV out and VGA out is not possible with the M690T/M690E's three on-chip D-A converters. Once these converters are utilized for VGA out, you must rely on the M690T or MT90E's Digital Video Output (DVO) port to connect to an external TV encoder.

Several manufacturers offer an external encoder such as Chrontel, VIA, Focus Enhancements, and NXP (Philips). These TV encoder makers manufacture chips that connect to the M60T/M690E's DVO bus output and converts the digital graphics and timing data to analog standard definition (composite, S-Video) and high definition TV outputs (component YP_RP_B). The benefit of using an external device is that these manufacturers make encoders and transmitters which can not only provide a primary or secondary TV output, but can also transmit a second VGA output or even a TV output with enhanced features not currently supported by the MT690T such as SCART, SECAM, and others.

12. Is Macrovision anticopy protection on at all times?

No. The Macrovision algorithm should only turn on when a software-based video playback application is open and/or active within the Windows® operating system and is processing Macrovision-protected content. At all other times, Macrovision will be turned off by the graphics drivers.

Macrovision-protected DVD discs themselves contain "trigger bits" telling the player whether or not to enable Macrovision AGC, sync amplitude reduction, colorstriping, and end-of-field back-porch pulses. The triggers occur about twice a second, which allows fine control over what part of the video is protected. The producer of the disc decides the level of copy protection to enable. Just as with videotapes, some DVDs are Macrovision-protected and some are not.

13. Is the default state of the M690T Macrovision on or Macrovision off?

The power-up state for the M690T is Macrovision on. Thereafter, the graphics driver that supports the M690T from AMD enables and disables Macrovision depending on the software applications that are active and content being viewed from the TV output. Macrovision is turned on whenever the M690T's video (multimedia) driver is used and being displayed.

Macrovision protection from the M690T cannot manually be turned off or on by the end-user.

14. How do I turn Macrovision on within the M690T?

The AMD BIOS and driver in conjunction with DVD discs that contain "trigger bits" configure the M690T to enable Macrovision or not at appropriate times. System designers using the M690T can not control whether Macrovision is on or off. The driver detects the type of content being viewed (and potentially copied) and enables Macrovision at a level set by the content provider. Exact details regarding the Macrovision process and registers are found in the official Macrovision specification. Contact Macrovision to obtain a copy of this document.

15. I believe that my application will require Macrovision, but what components of Macrovision should be turned on via the M690T?

Depending upon the application, the Macrovision components and waveform required will vary. The driver provided by AMD for the M690T will detect the video playback application and content type and turn on the appropriate components of Macrovision protection.

16. I don't see a Macrovision section in the M690T data sheet. Why?

The Macrovision registers and related information do not appear in the M690T data sheet. Macrovision requires that AMD not disclose this data publicly.

17. Does the M690T's HDTV outputs contain Macrovision?

Yes, the M690T provides copy protection for HDTV 480p outputs. It does this by implementing guidelines found within Macrovision's specification titled *AGC Copy Revision 1.03 for 525p (480p) Progressive Scan HDTV YPRPB outputs*.

When copyrighted high definition content is viewed in HDTV Y PR PB analog out, it is usually down-sampled to 480p and Macrovision protected by the player or consumer electronic equipment.

18. There are multiple standard definition analog formats in use today such as NTSC, PAL, SECAM, and R/G/B/PAL SCART. Is the M690T Macrovision capability able to copy protect all the different SDTV formats?

The M690T is fully Macrovision-compliant and can therefore copy protect the standard definition TV outputs it provides in NTSC or PAL formats. An external DVO-compatible TV encoder is required to copy protect SECAM and R/G/B/PAL SCART because these less common standard definition TV outputs are not provided from the M690T.

The 525-line (NTSC) format and 625-line (PAL) formats require different internal settings in the TV out transmitting component because the total number of lines, the color subcarrier frequency and other aspects of the video signal are different. Macrovision's specifications recognize these differences and provide very detailed instructions on how to handle these inconsistencies.

19. What are the APS modes?

The APS (Analog Protection System) modes are default register settings, specified by the Definition of the Default Settings of the Macrovision Antitaping Process for DVD Products, Revision 1.01, December 30, 1997. For more details, contact Macrovision to obtain a copy of this document.

20. Can Macrovision's AGC bright pulses enabled by the M690T damage my equipment?

No. The brightness is actually only about 20% over the normal white level, so no harm should occur.

21. If I record Macrovision-protected content and play it back, what is seen visually?

Typically, you will be able to see the original content interspersed with stripes of color, picture distortion, loss of vertical synchronization and rolling, black/white picture, and dark-to-light-to-dark cycling.

22. What does a TV picture with colorstriping look like?

A sample TV image generated from content protected with Macrovision's colorstriping is reproduced in Figure 3. (The visual effects of colorstriping are much easier seen in within the electronic document.)

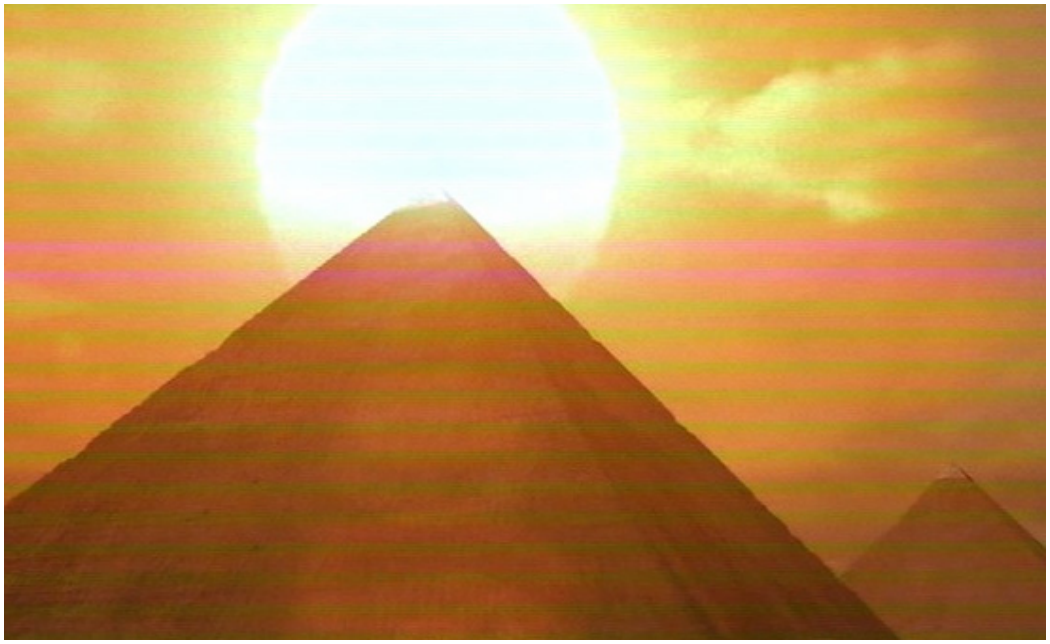

Figure 3. Standard-Definition TV Output from Copied Signal with Colorstriping Macrovision Component On