Pioneer New Media Technologies, Inc.

Understanding the New 635nm and 650nm DVD-Recordable Formats

Introduction

The DVD Forum has announced that there will soon be two kinds of 4.7 GB DVD-Recordable (DVD-R) media available; one for "authoring" and one for "general" use. Authoring media will essentially be a continuation of the existing 635 nanometer (nm) DVD-R technology, and will be recordable on drives with 635nm lasers. General media will be recordable on as-yet unreleased DVD-R drives that will use 650nm lasers. This document provides a brief explanation of both formats as well as Pioneer's position on related product support.

Background: Why were 635nm lasers originally used for DVD-R?

In 1994-1995, Pioneer Corporation developed a high-capacity, write-once disc technology. The target capacity for 12cm CD-sized discs was 5.0 GB. For a variety of reasons, it was determined that recording lasers with a 635nm wavelength were best suited to achieve this recording density.

As the entertainment and computer industries began to define a standardized disc format, later known as DVD, Pioneer became a founding member of the DVD Forum. In addition to helping define the overall DVD format, Pioneer proposed a write-once DVD specification based on the 635nm results achieved in 1994/95. This eventually became known as DVD-R, version 1.0, with a disc capacity of 3.95 GB.

The DVD Forum approved version 1.0 of the DVD-R format in 1997. In October of that same year, Pioneer began to ship early samples of its first generation DVD-R drive. This drive was built largely in response to a growing requirement in the DVD industry for a method of producing a disc without the expense of mastering and replication. Since this drive supported version 1.0 of the DVD-R specification, it utilized a 635nm laser.

DVD-R technology has been an enabler for the DVD industry. The ability to produce content and verify its compliance with the DVD specifications on an immediate and economical basis has become an important tool for title developers.

In response to the growing need for a higher capacity and generally affordable drive, Pioneer developed its second-generation drive in July of 1999. The drive's full 4.7 GB capacity also helped the DVD industry move into areas beyond the theatrical market. As with the first generation, this product continued to use 635nm laser technology, allowing

it to support both the existing 3.95 GB media as well as version 1.9 “sample” DVD-R media containing 4.7 GB.

Two types of DVD-R

Meanwhile, during the first three years of DVD’s existence, high-powered 650nm laser diodes were developed for a variety of other products. Because they are manufactured in larger volumes then 635nm lasers, 650nm lasers have been developed to a point where they now offer some advantages. First, their operating temperature range is wider than 635nm lasers. Also, because they are manufactured in larger volumes, their cost is lower and they are available from a wider array of suppliers. From a product design point of view, these attributes allow a DVD-R drive manufacturer to provide additional benefits to its customers, including an increase in a product’s operating temperature range – important when making internal half-height drives – as well as the ability to offer them for a lower overall cost.

Both the 635nm “authoring” and 650nm “general” media will continue to offer the same fundamental advantages of write-once security and widespread DVD playback compatibility. Although each type of blank media can only be written with the corresponding drive (i.e. 635nm discs on 635nm drives, and 650nm discs on 650nm drives), BOTH TYPES OF DVD-R MEDIA WILL BE PLAYABLE ON ANY DVD PLAYER OR DRIVE THAT SUPPORTS DVD-R. In other words, this is a writing compatibility issue and NOT a reading compatibility issue.

Pioneer’s Position

- Pioneer will continue to support both 635nm DVD-R formats (3.95 and 4.7 GB). We believe that 635nm DVD-R technology will continue to have applications in both authoring and title development. At the same time, once the promising aspects of 650nm laser technology can be employed in future DVD-R products, we plan to support “general” recording products as well.

- It is important to note that a 635nm drive does not discern between different types of data, and can be used to store any type of text, images, or other non-video information. Thus, the term “DVD-R for authoring” refers to either DVD video or DVD-ROM data “authoring”. Likewise, a “general” use 650nm DVD-R drive can also be used to write DVD video data – as long as there is no CSS encryption protecting the content.

- Pioneer supports the protection of copyrights and does not endorse any effort to make illegal copies of copyrighted material.

Thank you for your interest in Pioneer DVD-R products.