

# PLDS Optical Drive Crossflashing

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## **Executive Summary**

Adding (or removing) features to optical drives made by Philips & Lite-On Digital Solutions is possible by modifying the drive firmware. The drives have built-in security measures to prevent this, but these are easily bypassable with the proper tools. This allows the user to convert their drive to a different model.

## Terms Used

**“A-Series” Firmware:** Firmware with a version number taking the form of ALxx, where xx is a set of two letters and/or numbers

**EEPROM:** Memory contained in the drive that stores configuration data, such as the drive model and settings

**Flash (noun):** A type of memory used to hold the firmware in many devices, as well as many other uses

**Flash (verb):** To write firmware to flash memory, replacing the existing firmware

**“G-Series” Firmware:** Firmware with a version number taking the form of GLxx, where xx is a set of two letters and/or numbers

**LabelTag:** Technology allowing the user to “burn” visible text or graphics to the bottom side of a disc, not requiring a special disc

**LightScribe:** Technology allowing the user to use an optical drive to “burn” visible text or graphics to the top side of a specially coated CD or DVD

**PLDS:** Philips & Lite-On Digital Solutions

**SmartErase:** A feature on an optical drive allowing the user to render a write-once disc (CD-R, DVD-R, or DVD+R) unreadable by overwriting the data

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One of the most popular series of drives from PLDS is their line of retail 24x SATA DVD±RW drives, sold under the “Lite-On” brand. These drives have model numbers of the form iHASx24, where x is a number from 1 to 6. Generally speaking, higher numbers add more features, although a full list of the models and their associated features is available in appendix A. Since setting up an assembly line to produce a given product can often be very expensive, PLDS chose to use the same hardware for certain models, with the firmware present on the drive determining which features are available. Within the iHASx24 series, the iHAS124, iHAS324, and iHAS524 all share the same hardware and use “A-series” firmware. Similarly, the iHAS224, iHAS424, and iHAS624 also share the same hardware, and all use “G-series” firmware. The hardware between these two sets of drives is different, however, with the latter set adding LightScribe index hardware that is not present in the former.

PLDS most likely realized that by producing multiple models of drive with the same hardware, that users could simply buy the cheapest drive, flash the firmware from the top-of-the-line model, and be able to use all of the features despite not having paid for a drive that has them. To help prevent this, there are two security measures built into these drives. First, the official firmware update utilities check the model number reported by the drive. If it is incorrect, for example if the user is attempting to flash iHAS324 firmware to an iHAS124, the program will display an error message and exit. To work around this, a person going by the name of C0deKing developed a special tool called the “Flash Utility” that allows reading and writing firmware on most PLDS optical drives, including the iHASx24 series. This tool does not perform any model checking, and therefore it is possible to flash the “wrong” firmware for the drive. This can be helpful when attempting to upgrade a drive, but it can also be dangerous if the user attempts to flash incompatible firmware. PLDS does appear to have realized that a user may manage to flash firmware for a different model, so they did build a second security

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measure into the drive. A copy of the drive's model number is stored in the EEPROM inside the drive, and this is compared to the model number in the firmware each time the drive is powered on. If they do not match, the drive will continuously blink the activity light and will not operate. However, C0deKing developed a utility known as the "EEPROM Utility" that is capable of reading the firmware present in the drive and updating the EEPROM values to match. After flashing the firmware for the desired model and updating the EEPROM to match, the drive will operate as the new model with all associated features.

In addition to upgrading iHASx24 drives to other iHASx24 drives, this process can also be used on some OEM drives produced by PLDS, as well as drives produced by PLDS for other brands. This works because PLDS, similarly to the different models within the iHASx24 series, produced many other drives using the same hardware. Two of these, for example, include the Lite-On DH-24ABS and Asus DRW-24B1ST. The DH-24ABS was sold to several computer manufacturers as a plain 24x DVD±RW drive, with no added features. The DRW-24B1ST, meanwhile, was sold by Asus as a 24x DVD±RW drive with an added "E-Hammer" feature performing the same function as SmartErase. Internally, the hardware is the same as the iHAS124/324/524 drives, and the firmware is very similar to the iHAS124 and iHAS324 firmware, respectively. Using the same technique as described above, these drives can both be converted to an iHAS124, 324, or 524 as desired. Since firmware updates for these drives are often provided by a third party instead of by PLDS, converting the drive to an iHASx24 often allows the use of newer firmware directly from PLDS. This can often resolve minor issues, improve performance, and enable compatibility with newer media, even if not upgrading the drive from where it originally was in the series.

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In conclusion, many optical drives made by PLDS can be quite easily converted to different models. Not only can this allow updates to be applied that would otherwise not work, but it can add new features to the drive. To combat this, the drives have multiple security measures, but these are easily worked around. The various workarounds combined with the various unofficial tools make this a quite easy process overall.

## **Recommendations**

Make backups of the flash and EEPROM data before performing any modifications.

After flashing the firmware for the desired model and updating the EEPROM, reboot the computer, then flash the latest firmware for the new model and reboot again.

If crossflashing many drives at a time, it may be more efficient to reverse-engineer the flash and EEPROM utilities and write a new program to work automatically on several drives at once.

## Appendix A: Lite-On iHASx24 Feature Matrix

	LightScribe	SmartErase	LabelTag
iHAS124			
iHAS224	✓		
iHAS324		✓	
iHAS424	✓	✓	
iHAS524		✓	✓
iHAS624	✓	✓	✓

## Appendix B: Lite-On iHASx24 Latest Firmware For Revision B Drives

### Latest Version (for updating)

iHAS124	AL0S	<a href="http://www.firmwarehq.com/download_1905-file_AL0S.EXE.html">http://www.firmwarehq.com/download_1905-file_AL0S.EXE.html</a>
iHAS224	GL0B	<a href="http://www.firmwarehq.com/download_1913-file_GL0B.EXE.html">http://www.firmwarehq.com/download_1913-file_GL0B.EXE.html</a>
iHAS324	AL1B	<a href="http://www.firmwarehq.com/download_1909-file_AL1B.EXE.html">http://www.firmwarehq.com/download_1909-file_AL1B.EXE.html</a>
iHAS424	GL1B	<a href="http://www.firmwarehq.com/download_1912-file_GL1B.EXE.html">http://www.firmwarehq.com/download_1912-file_GL1B.EXE.html</a>
iHAS524	AL2A	<a href="http://www.firmwarehq.com/download_1910-file_AL2A.EXE.html">http://www.firmwarehq.com/download_1910-file_AL2A.EXE.html</a>
iHAS624	GL2A	<a href="http://www.firmwarehq.com/download_1911-file_GL2A.EXE.html">http://www.firmwarehq.com/download_1911-file_GL2A.EXE.html</a>

### Unscrambled (for crossflashing using Flash Utility)

iHAS124	AL0L	<a href="https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS124_B.AL0L.stock.rar">https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS124_B.AL0L.stock.rar</a>
iHAS224	GL08	<a href="https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS224_B.GL08.stock.rar">https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS224_B.GL08.stock.rar</a>
iHAS324	AL18	<a href="https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS324_B.AL18.stock.rar">https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS324_B.AL18.stock.rar</a>
iHAS424	GL18	<a href="https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS424_B.GL18.stock.rar">https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS424_B.GL18.stock.rar</a>
iHAS524	AL27	<a href="https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS524_B.AL27.stock.rar">https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS524_B.AL27.stock.rar</a>
iHAS624	GL27	<a href="https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS624_B.GL27.stock.rar">https://web.archive.org/web/20130405032012/http://codeguys.rpc1.org:80/firmwares/dvdrw/stock/ATAPI.iHAS624_B.GL27.stock.rar</a>



## Appendix C: Useful Links

**EEPROM Utility:** Used to modify EEPROM data in PLDS optical drives, including changing the stored model number to match the installed firmware.

<https://club.myce.com/t/eprom-utility-for-plds-liteon-sony-cd-dvd-writers-v6-2-0-se/101108>

**Flash Utility:** Allows reading the firmware from and flashing any unscrambled firmware to PLDS optical drives.

<https://club.myce.com/t/flash-utility-for-plds-liteon-based-optical-drives-v7-2-0/172584>

**MediaCodeSpeedEdit (“MCSE”):** Allows editing firmware for PLDS optical drives to write discs at different speeds than would normally be allowed.

<http://ala42.cdfreaks.com/MCSE/>

**Crossflashing Instructions:** Provides a detailed description of the process used to crossflash iHASx24 revision B drives.

<http://forums.afterdawn.com/threads/tutorial-how-to-crossflash-a-liteon-ahas-drive-to-unlock-features.740199/>

## **Appendix D: Outline**

- I. Introduction to iHASx24
- II. Body
  - A) Crossflashing within iHASx24
    - 1. Security measures
      - a) Model check in flasher
        - (1) Official flasher will not cross-flash
        - (2) Use Flash Utility
      - b) EEPROM model data
        - (1) Flashing light
        - (2) Use EEPROM Utility
    - B) Crossflashing other series
      - 1. Example models (DH-24ABS/DRW-24B1ST)
      - 2. Benefits
- III. Conclusion
- IV. Appendices
  - A) iHASx24 feature matrix
  - B) iHASx24 latest FW versions
  - C) Tools
  - D) This outline