DataPlay, a New Technology for Information Distribution

Agenda

DataPlay Micro-optical engine & media

Key enabling innovations

Optical head and Actuator

Optical media

Electronic system

Custom ASIC controller

Interface

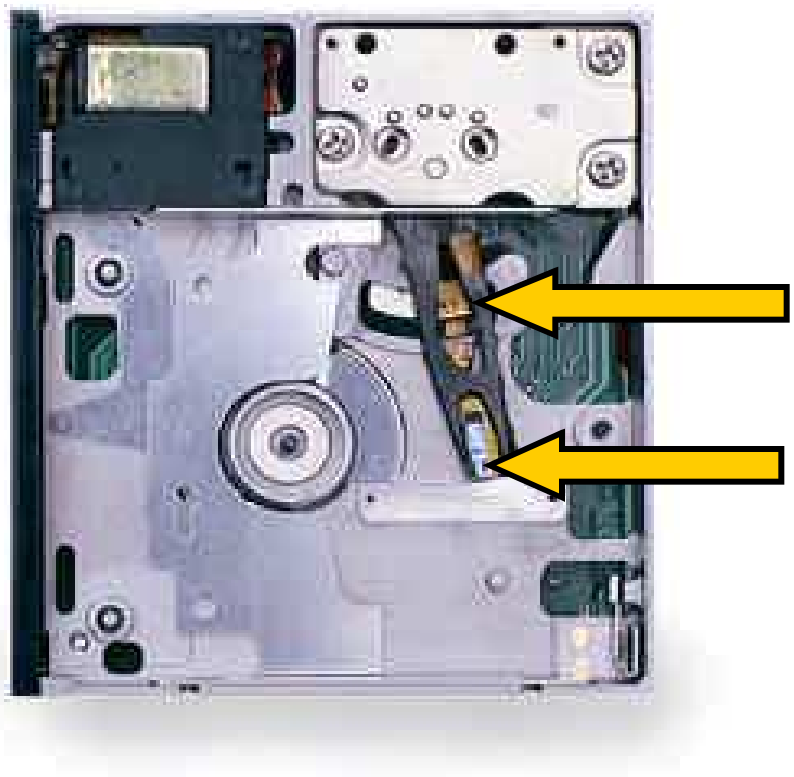
Content protection & activation method

DataPlay technology – Micro-optical engine & Media

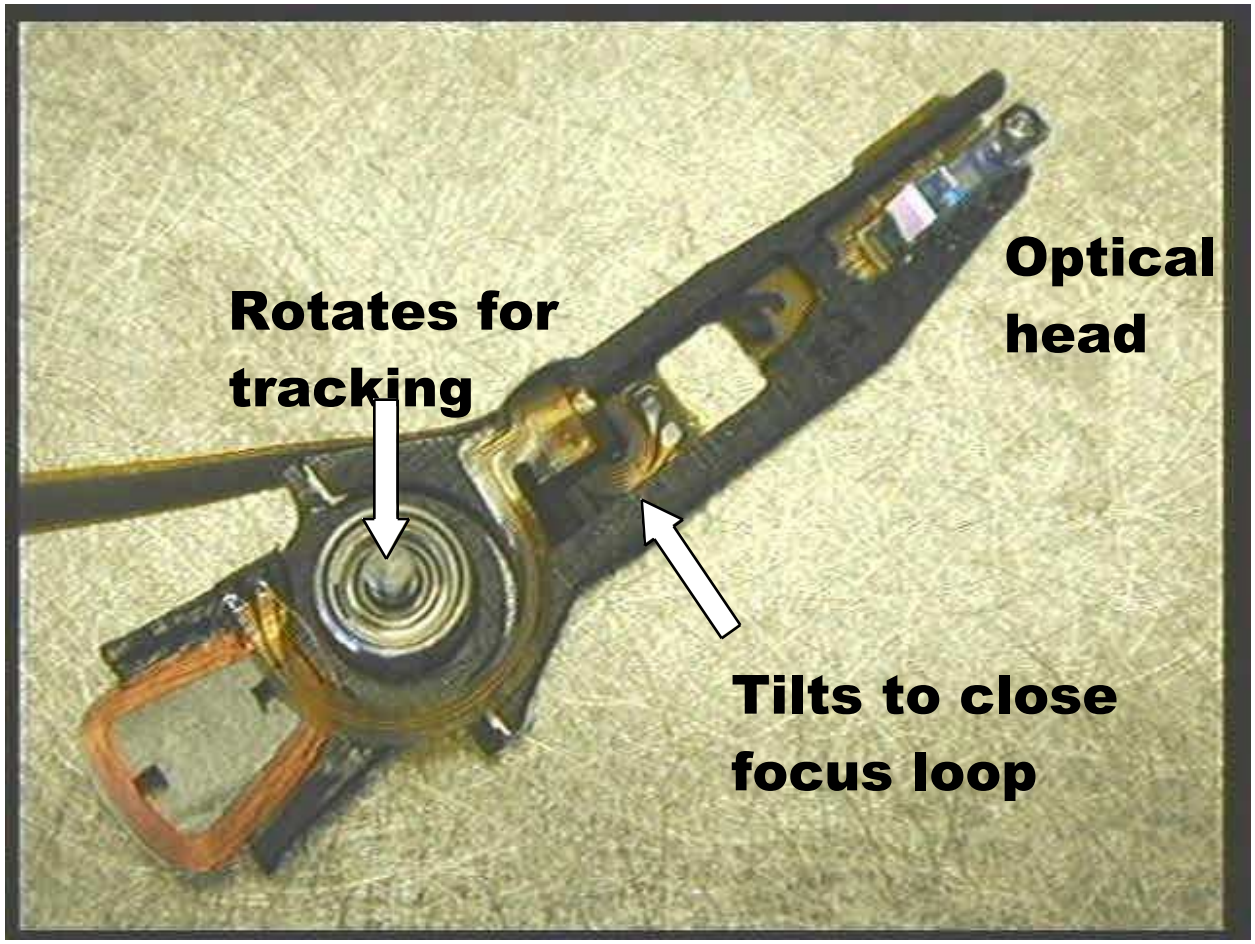
- Integrates to all device types
- Full function optical drive with record and playback
- Matchbox sized
- Portable power levels

Archival media with prerecorded and recordable function

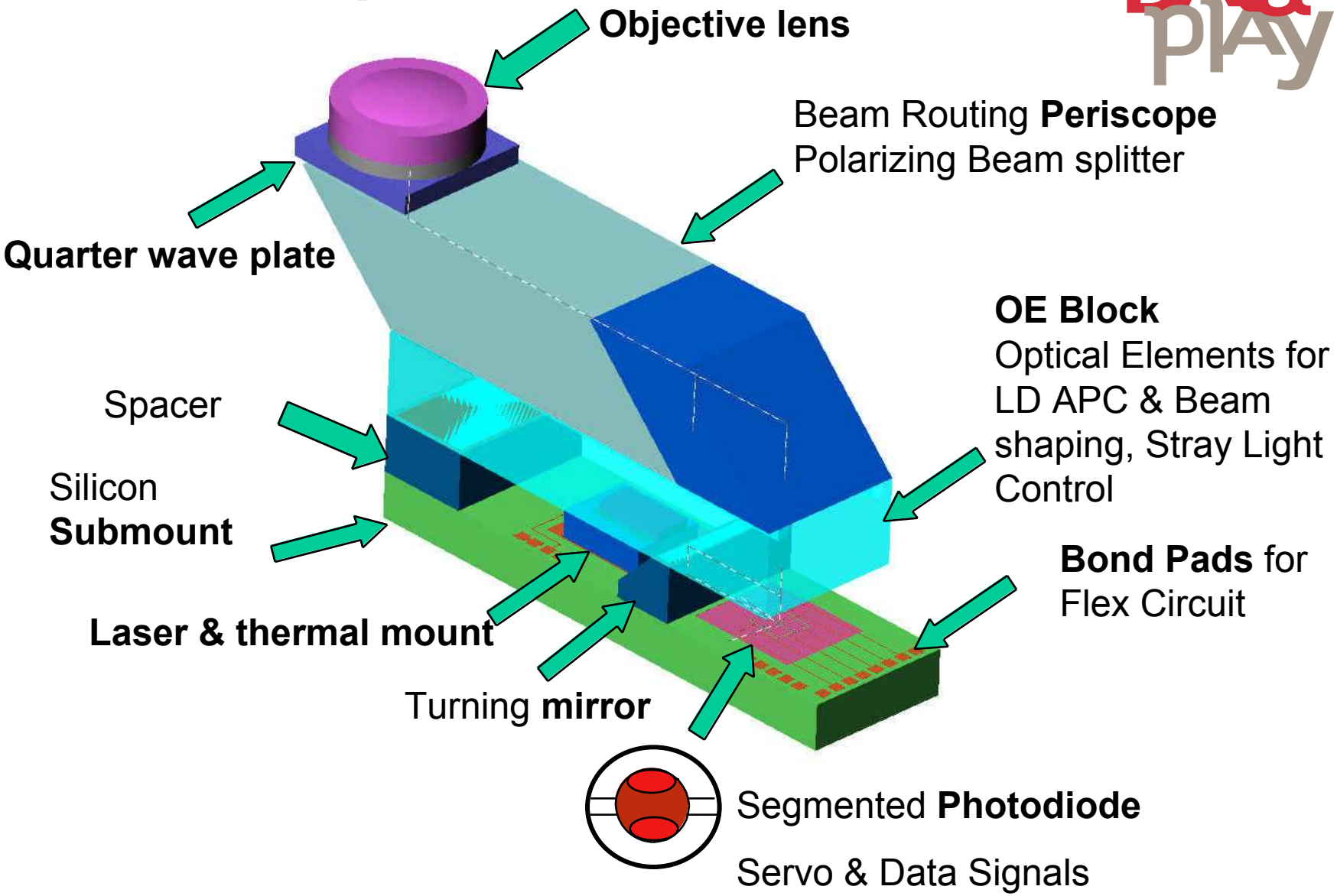
DAta™ pAy



Actuator with Optical Head

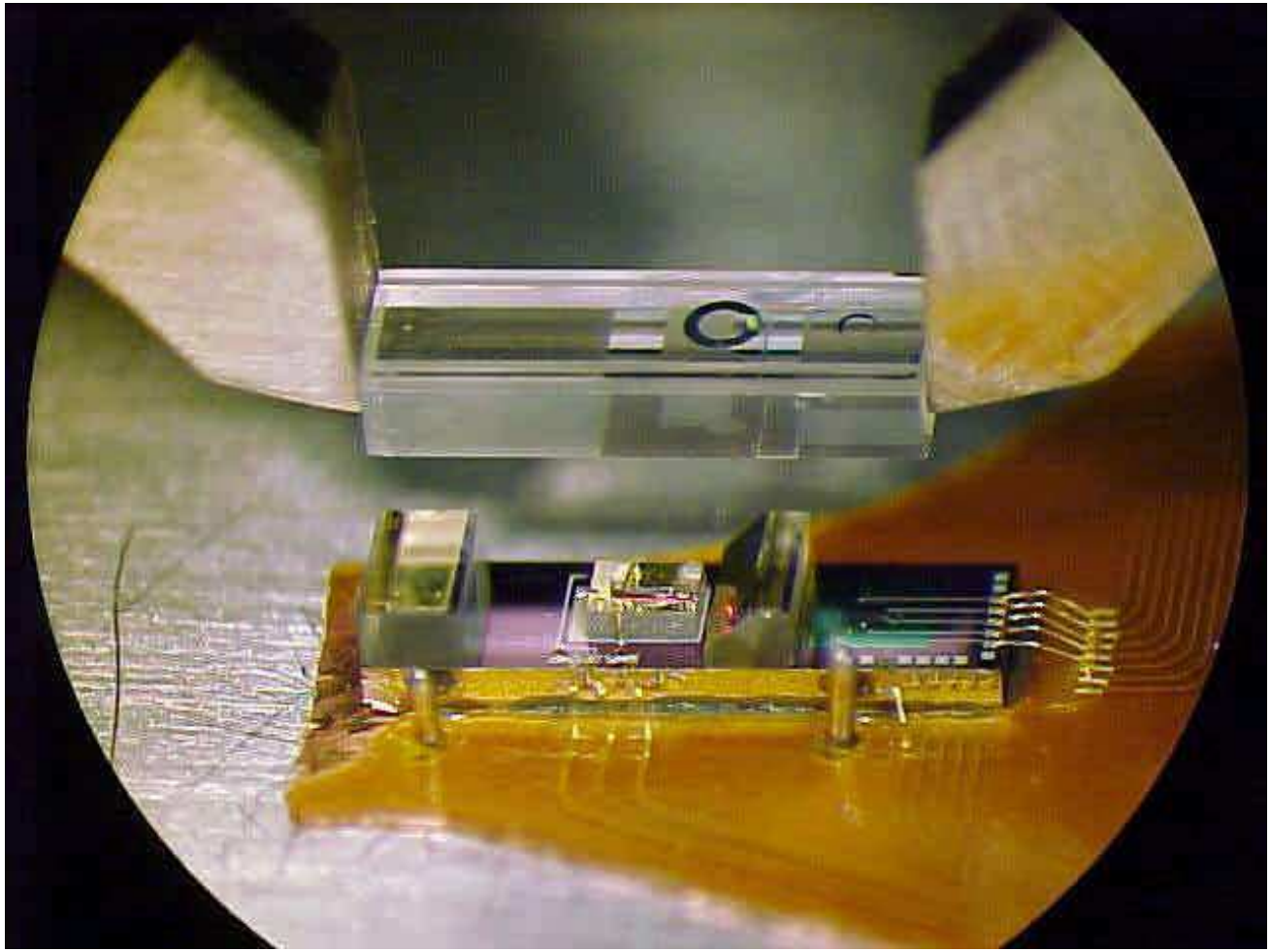


The OPU-Optical Head

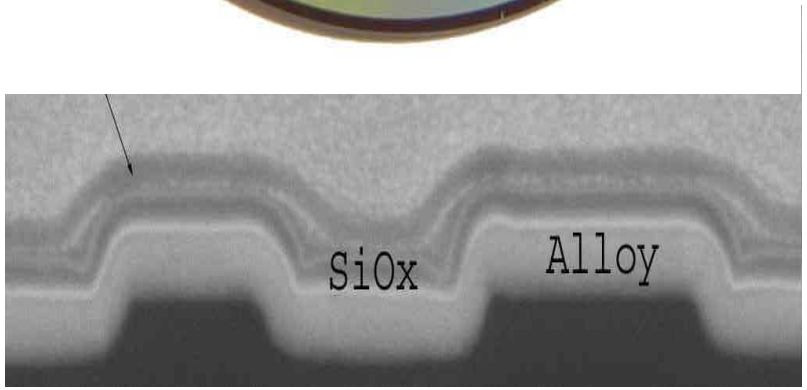


Micro-Optics Active Alignment

DataPlay Module



DataPlay Digital Media



Polycarbonate substrate
0.6mm X 32mm

Molded both sides

Front surface recording

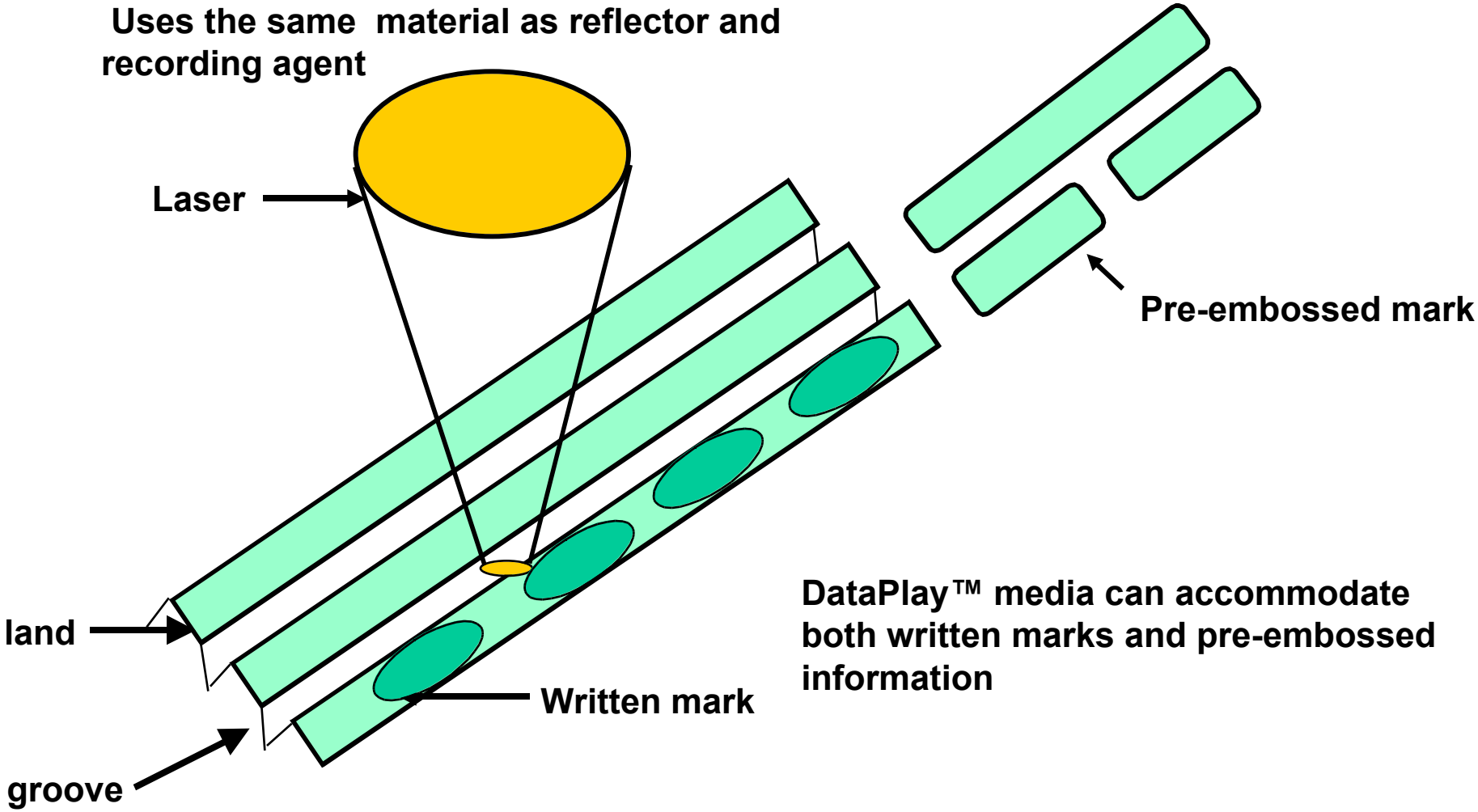
2 layer active surface

Amorphous to crystalline
Phase change

Recordable Mastered Media

Uses the same detector for data and recorded information

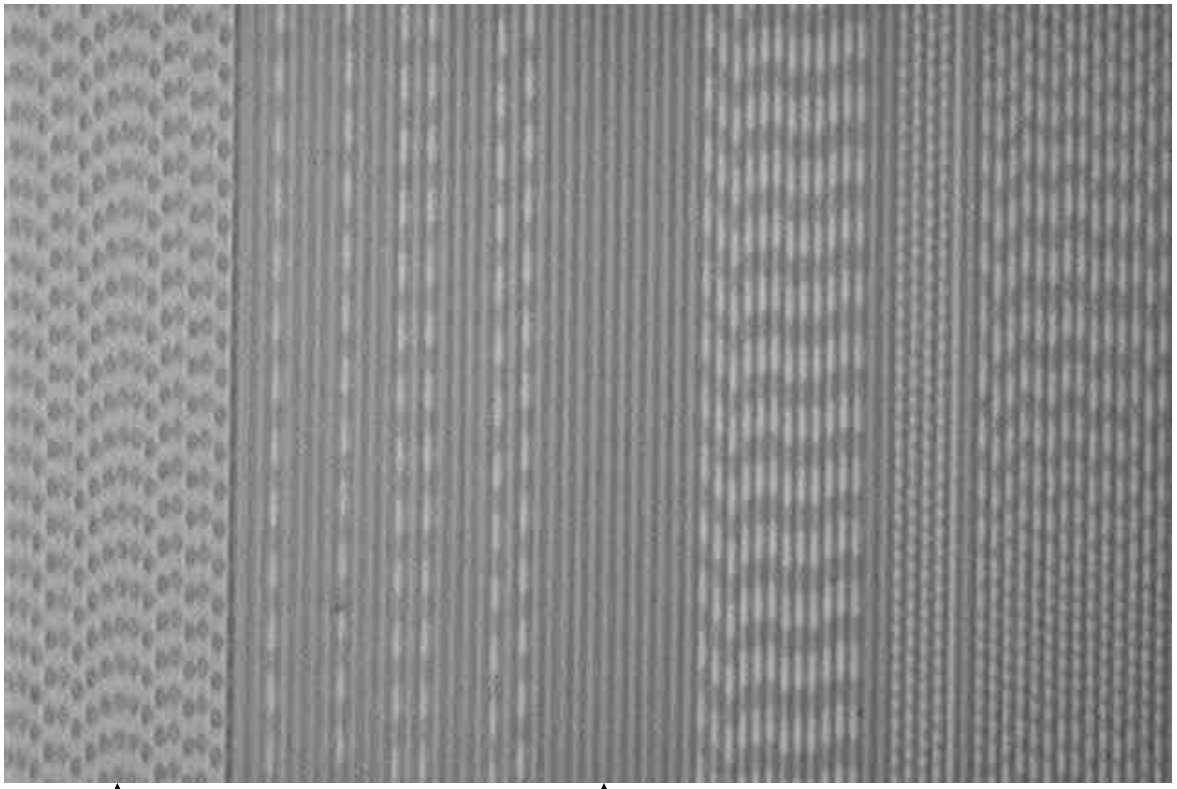
Uses the same material as reflector and recording agent



DataPlay™ media can accommodate both written marks and pre-embossed information

DataPlay Media

Microscope photo of pre-mastered data and written data on a 32mm dia. DataPlay^{tm} disk

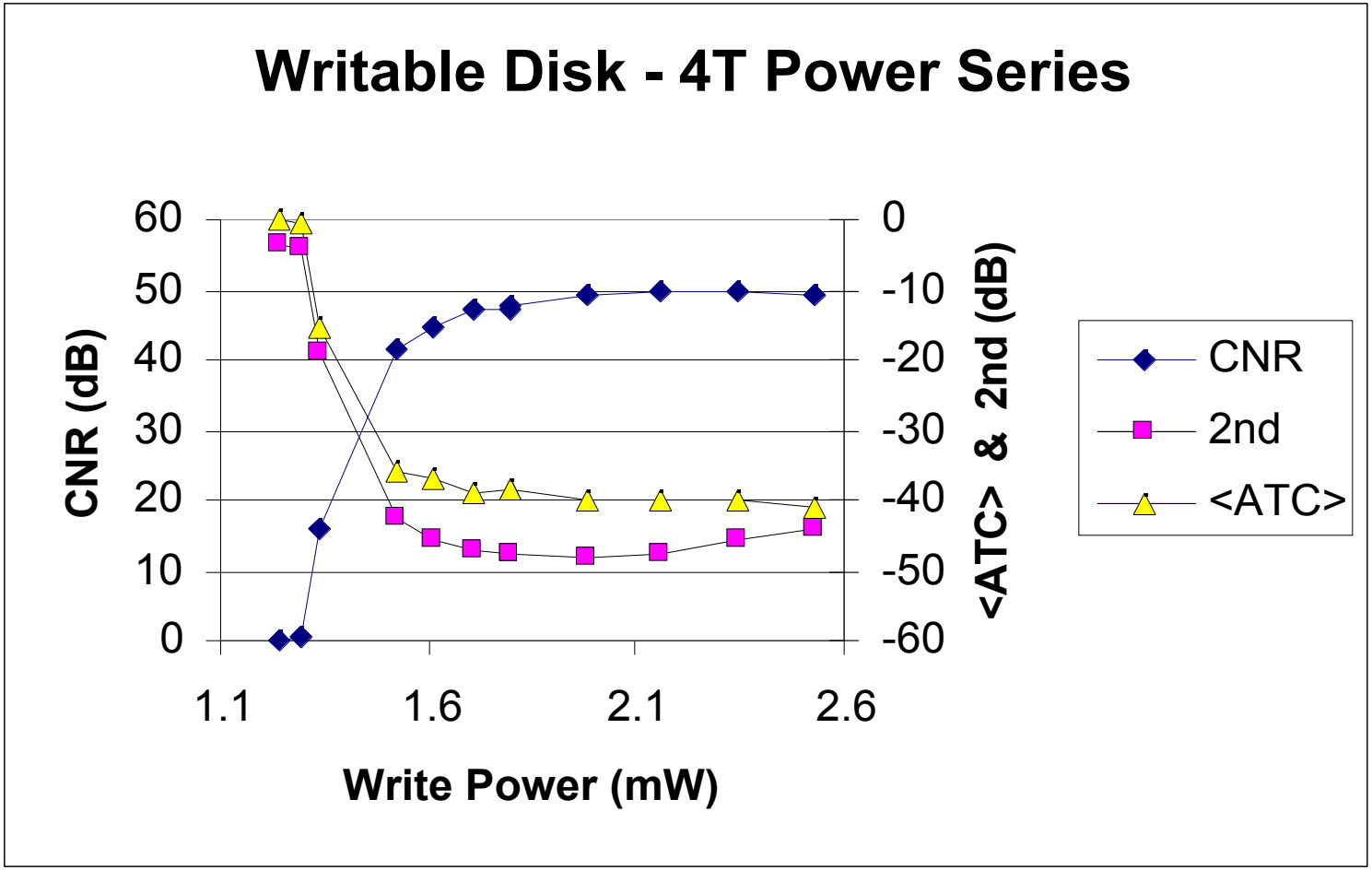


Pre-mastered Data (bright background, dark pits)

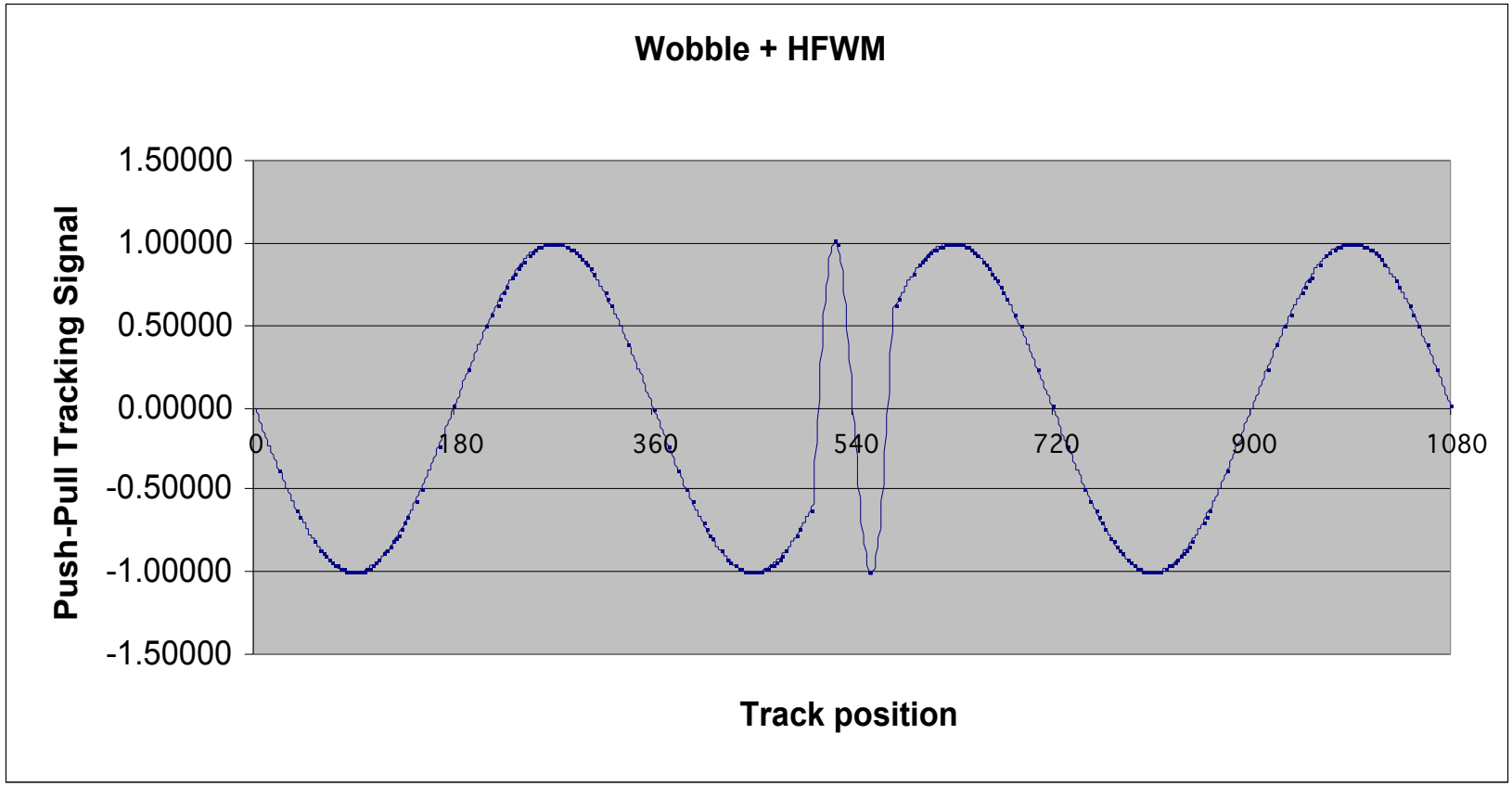
Un-written grooves

Written Data (dark background, light marks)

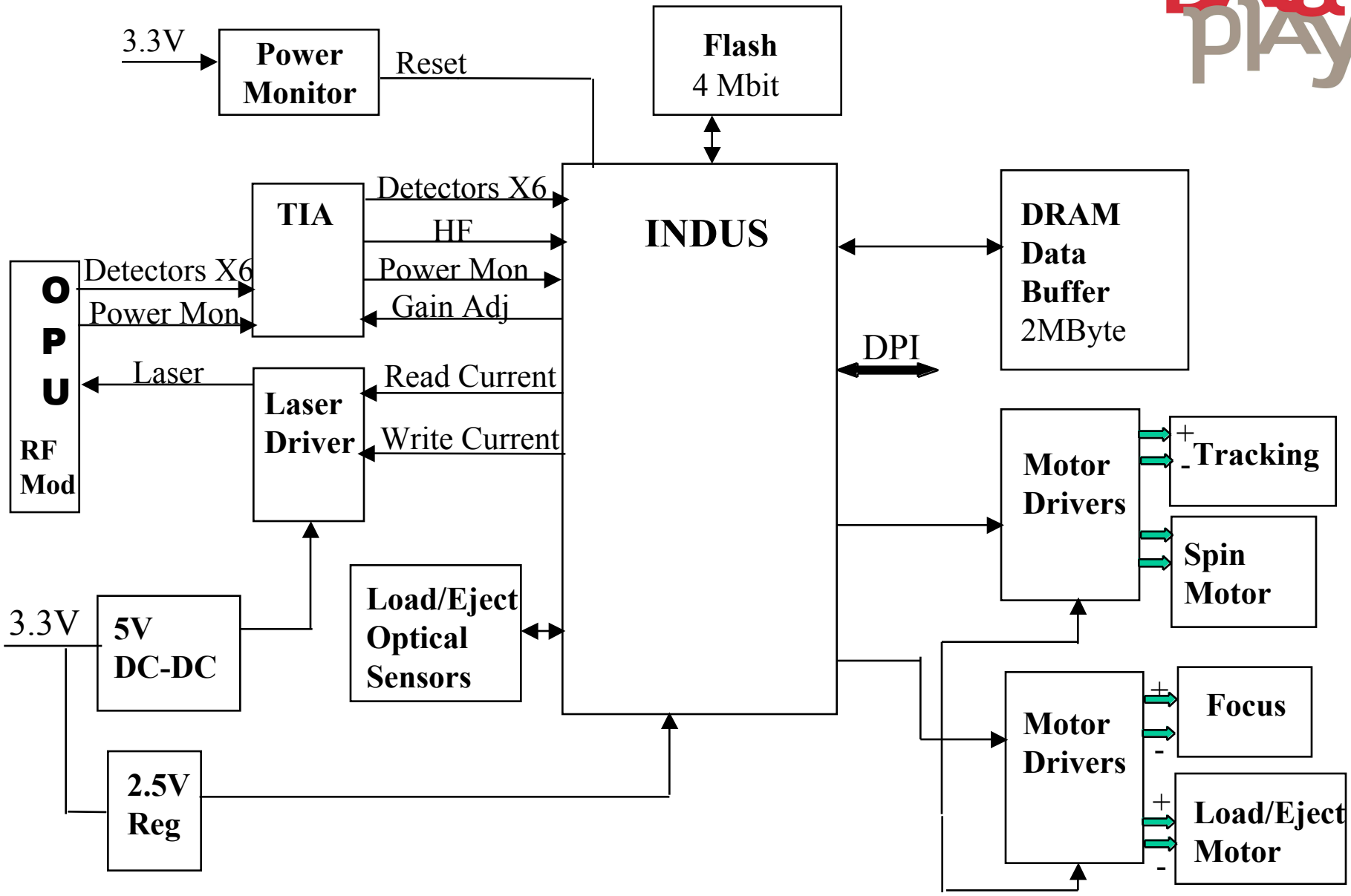
Media power series



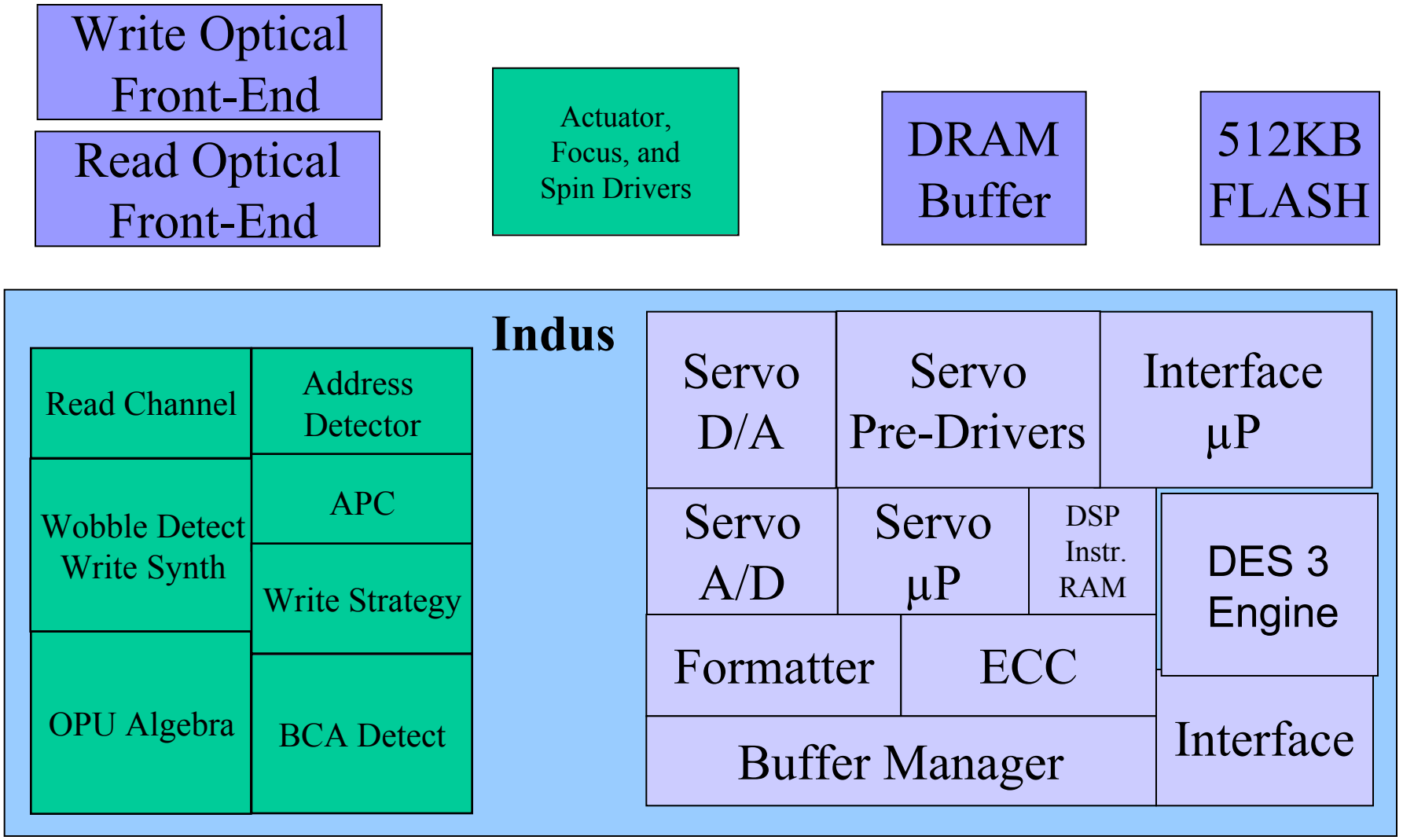
Timing and address marks



Electronics Block Diagram

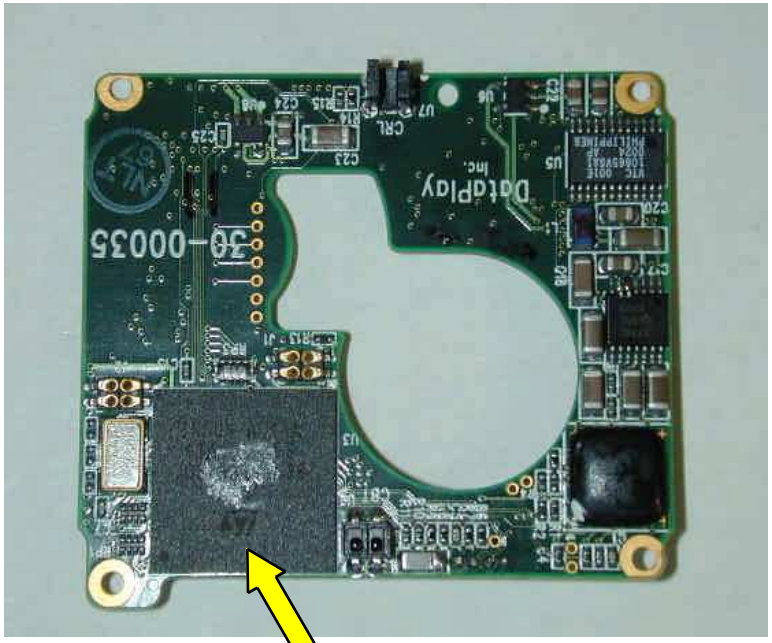


Electronics Block Diagram



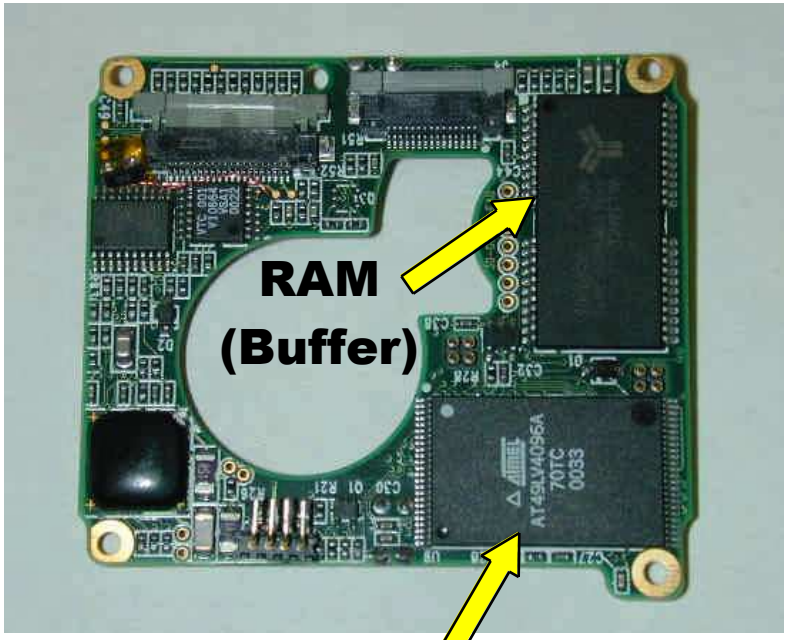
Engine Electronics PCBA

Top Side



Indus
Controller I.C.

Bottom Side



Flash ROM
(Firmware)

Key Invention--Custom ASIC “Indus”

Embedded ECC
(error correction code)
most powerful known
uses DataPlay invented
correction method

Single chip Read / write
Controller-first ever

Embedded on the fly
encryption for Content
Protection and Key encryption

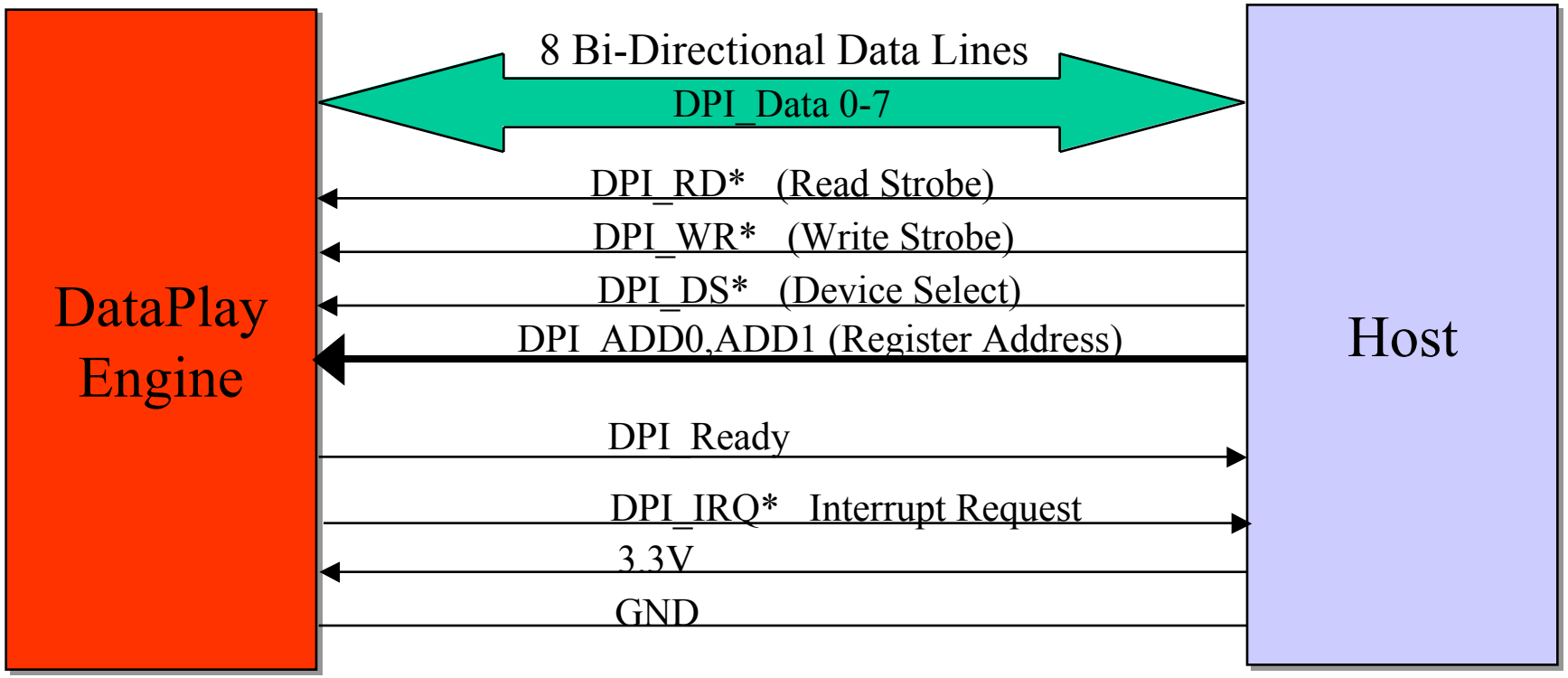
DataPlay
digital servo allows
strong shock protection

Power

Production Level Engine Goal

	•Full Read	•Idle	•128Kb/sec
•Current (3.3V in mA)	•352	•18	•26
•Power (3.3V mW)	•1163	•60	•85
•Batt. Life (2XAA hrs)			•55
•Batt. Life (2XAAA hrs)			•24

DataPlay Interface



15 signal lines, 3 power supply lines → 18 Total

DataPlay File System Interface

-DFS

- --Supports content protection
- --Intelligent device level caching
- --Only requires single software translator
- --No limit to storage capacity
- --Supports long file & directory names

ContentKey™ Definition

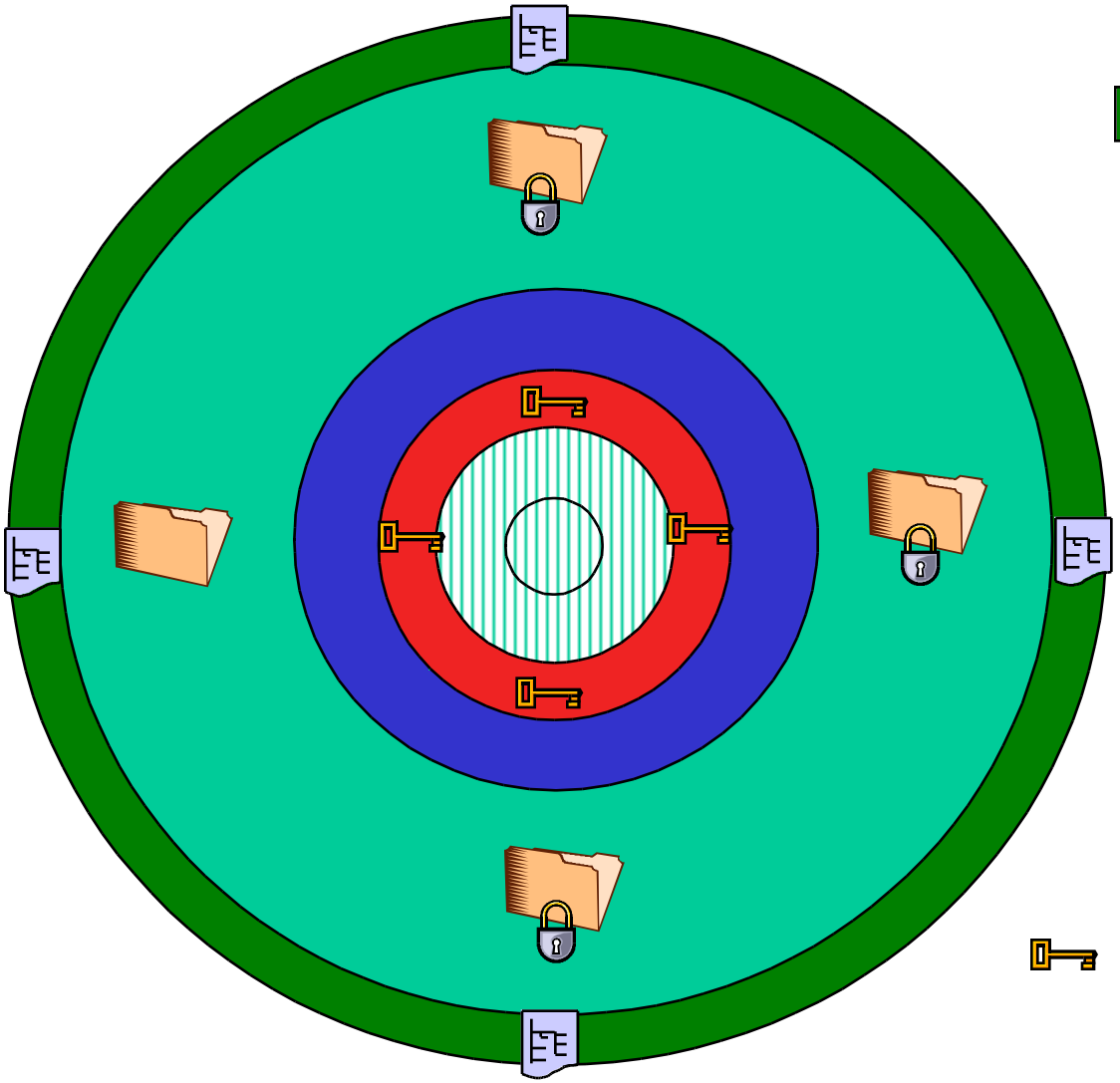
ContentKey™ -- A DataPlay mechanism that allows an authorized user to gain permanent or temporary access to digital content on a DataPlay.com cartridge via the internet.

The ContentKey™ itself is encrypted on the disk cartridge in a region that is not accessible by the user. ContentKey™ is a part of the DataPlay File System.

The ContentKey™ can take on two forms:

- **Enable or,**
- **Enable with decryption key**

Mastered DataPlay Disk



Encrypted Mastered File System

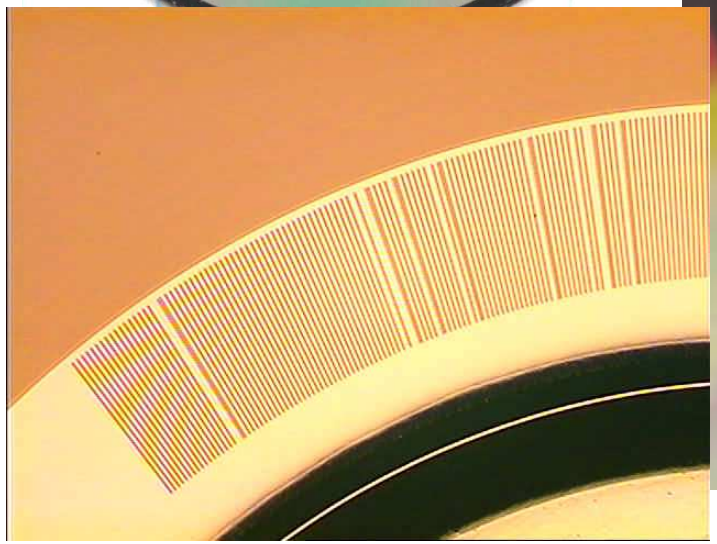
Mastered Content Image

User Writeable Area

Writeable Area for Encrypted ContentKey™ Storage

ContentKey™ downloaded during a ContentKey™ enable session

IRG Data Band-BCA



Summary of Performance

- Removable 32 mm DataPlay secure cartridge with 500MB user capacity
- Archival life of written and unwritten DataPlay - est. > 100yrs
- Pre-mastered and user recordable content on the same DataPlay
- Unique miniature DataPlay engine - 52mmX48mmX11mm
- Typical average power consumption in application mode <150 mw
- Average access time to retrieve random file < 200ms
- Simple 8-bit parallel interface
- ContentKey™ feature allows unique content enabling and access