Raytheon

Digital
High Resolution
Display
Technology

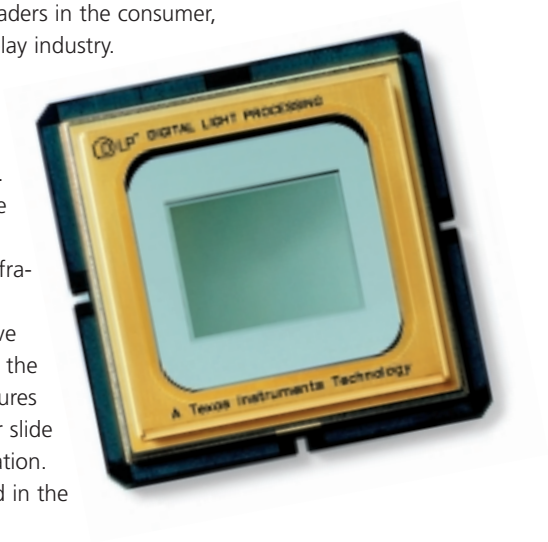


A New Way of Seeing Things.

Raytheon´s Digital Display

Digital Light Processing™(DLP™) by Texas Instruments is a revolutionary new way to project and display information. Based on the Digital Micromirror Device™ (DMD™) developed by Texas Instruments, DLP creates the final link to display digital visual information. DLP technology is being provided as subsystems or "engines" to market leaders in the consumer, business, military and professional segments of the projection display industry. In the same way the compact disc revolutionized the audio industry DLP is revolutionizing video projection.

DLP has four key advantages over existing projection technologies. The inherent digital nature of DLP enables noise-free precise image quality with digital gray scale and color reproduction. Its digital nature also positions DLP to be the final link in the digital video infrastructure. DLP is more efficient than competing transmissive liquid crystal display (LCD) technology because it is based on the reflective DMD and does not require polarized light. Finally, close spacing of the micromirrors causes video images to be projected as seamless pictures with higher perceived resolution, for movie projection, a computer slide presentation, or an interactive, multi-person, world wide collaboration. DLP is the only choice for digital visual communications, today and in the future.



SXGA 1280 x 1024 Digital Mirror Device (DMD™). The central, reflective portion of the device consists of 1,310,720 tiny, tiltable mirrors. A glass window seals and protects the mirrors. The DMD is shown actual size.

DLP™
A TEXAS INSTRUMENTS TECHNOLOGY



Naval
21" workstations
35" map tables
40" to 60" command center displays



Submarines
21" workstations
35" map tables
60" command center displays

User Benefits
Digital Ruggedized Display

Outstanding image quality
- Bright projection display – high light throughput efficiency
- Large-area flicker-free displays
- High contrast ratio
- Wide viewing angles, without color or gray scale inversion
- Distortion-free image – unlike CRT displays
- Pure color fidelity without adjustments
- Zero persistence or lag (no smearing or retention of moving data)
- Zero color convergence problems

Compact packaging for large displays
- Lightweight (less than half of a comparable CRT)
- Compact (21" fits into standard 19" equipment rack)

Proven performance at harsh environmental extremes (temperature, vibration, shock, altitude, salt fog)

Fully digital high resolution flat screen display
- 1280 x 1024 individually addressable pixels
- Square pixels with high pixel fill factor
- Inherently clean graphic displays
- Images can be created, processed, distributed, stored and displayed
- Can interface to sensors or computers, yielding cleanest image possible
- Ability to add processing to enhance feature or video quality
- Scalable to any size
- Reduced life cycle costs



One for All



High Seas
21" and 29" CRT
Replacements
Chart tables



Air Traffic Control
Tower and En-Route
Replacements



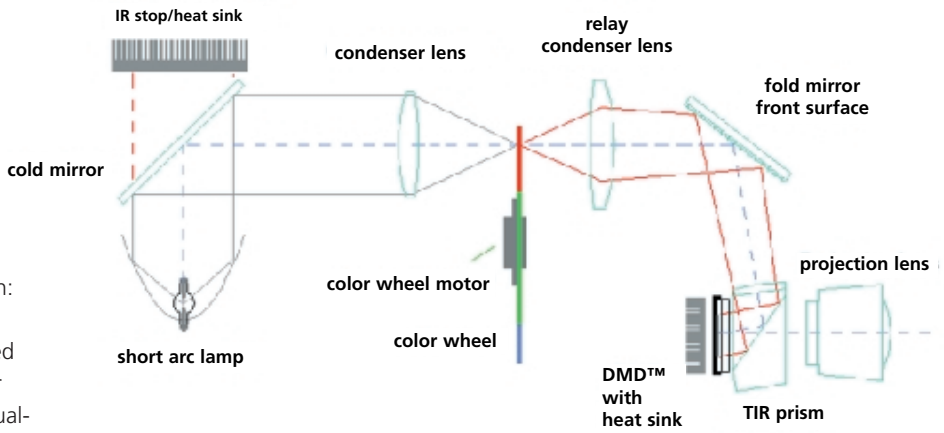
Airborne
Sensor stations
C^{4}I workstations
Command centers
21" workstations
40" command center or supervisor displays





Land
21" workstations
40" map tables
60" command center displays

Architecture for 1-Chip DLP™ Technology



The function principle of digital projection: The DLP™-chip is illuminated through a color wheel which has green, blue and red sectors. On the DLP™-chip there are over 1.3 million tiny mirrors, which are individually controlled and can be tipped with lightning speed. The reflected light is projected onto the screen through a projecting lens.



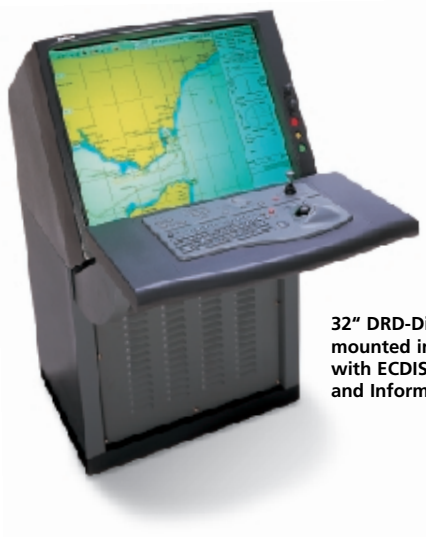
LCD



DLP™

Actual photographs of liquid crystal display (LCD) pixels and DLP™ pixels.

Projected images are made up of thousands of small pixels; DLP™ pixels are more uniform and more closely spaced than the polycrystalline silicon (poly-Si) pixels. Based on a superior pixel structure, DLP™ offers a higher fill factor and better image quality.



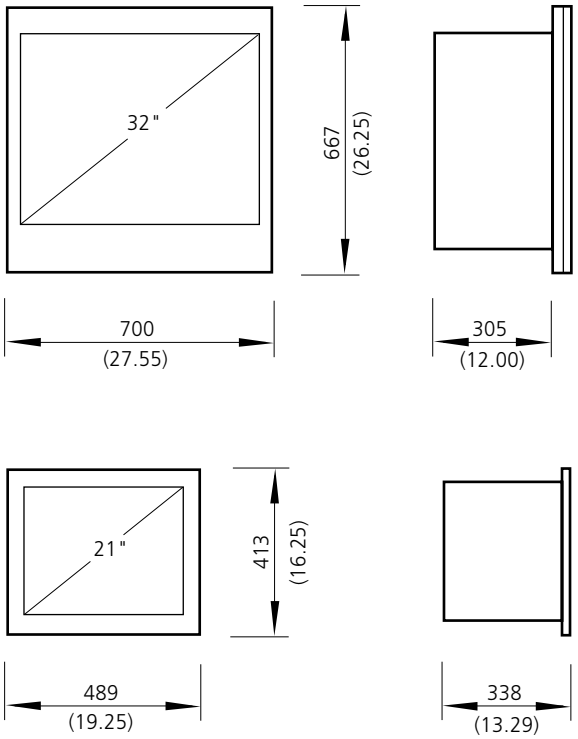
32" DRD-Display mounted in a standard bridge console with ECDIS (Electronic Chart Display and Information System)

Benefits over CRT/LCD technology

- Electromagnetic radiation-free
- No ground-loop noise or electromagnetic interference
- No emissions
- No warm-up time
- Low magnetic susceptibility
- No degaussing required
- True display size
  (21" equals full 21" viewing area)

Low life cycle cost for owner

- 100% electronics commonality
- High reliability
- Long life 100 Watt lamp
  (6,000 - 10,000 hours)
- Stable, consistent operation
- No convergence, registration or alignment requirements
- Maintenance can be performed with easy circuit board or lamp replacement
- No special tools required
- No vacuum components
- Can be stored for years without degradation.



Performance

Diagonal	21"
Viewing Area	16,4" x 13,2" Landscape or Portrait
Depth	12,6"
Weight	40 lb
Other Sizes	32", 35" and 40" displays have been demonstrated; easily extended to other sizes
Resolution	1280 x 1024 pixel at up to 72Hz
Pixel pitch	0.30 mm (square)
Color	24-bit, SMPTE 16.7 Million colors 256 gray shades
Luminance	70 fL
Contrast	200:1
Viexing Angle	± 60° hor & vert
Controls	contrast and brightness via software or hard-ware (buttons optional)
Video Interface	Digital or RGB (RS-343) analog input (Separate H/Vsync, Composite Sync, Com-posite Sync on Green)
Power	270 DC or 110V AC or 28V DX (future)
Power consump.	205W

Environment

Results validated by accelerated life testing

Vibration	MIL-STD-810, Method 514.4, 1 hour each axis, up to 45g (operating)
Operational	
Shock:	18 shocks of 9g
Crash Safety:	No hazard, 30g shock test
Temperature	
Operating:	-20°C to 55°C
Storage:	-46°C to 71°C
Altitude	
Operating:	Oft to 25K ft
5-min operating:	25K ft to 42K ft

- Withstands explosive decompression
- Passes MIL-810 explosive atmosphere test at 42K feet

EMI

- MIL-STD-461 emissions and susceptibility

MTBF

- 10,000 hour goal, with pre-planned lamp replacement at 5,000 hours
- Lamp easily replaced in the field

TM
Digital Light Processing, Digital Micromirror Device and DLP and DMD – are trademarks of Texas Instruments.

Dimensions in mm (inches)
Subject to alteration due to technical developments without notice.

Klein Navigation
A Division of Klein Associates, Inc.
11 Klein Drive
Salem, NH 03079-1249, USA
Tel 603-890-1304
Fax 603-890-9796
Email mail@kleinnavigation.com
www.kleinnavigation.com

Raytheon Marine GmbH
High Seas Products
Postfach 1166
D-24100 Kiel
Germany
Tel +49-431-3019-0
Fax +49-431-3019-291
Email ReceptionDE@raykiel.com

Raytheon