A 180° Look Into VIEWIZ®

AFFS Technology Tour
It’s not an object of your imagination.
It’s a simple example of VIEWIZ® everyday technology magic.
TFT-LCD screens for every application with unbelievable advantages - inside and out.

VIEWIZ® was created with working professionals in mind. The quality and care put into the making of these TFT-LCD panels is to enhance the performance skills of the customer whether they’re engineers, artists, media professionals, auto mechanics, expert gamers, medical workers...

The VIEWIZ® brand includes all products using AFFS technology. This catalog provides details on the technical side of VIEWIZ® and the specific advantages of each of our TFT-LCD product applications. Welcome to VIEWIZ® - Vision Magic!
Distinctive Technology: AFFS in VIEWIZ®

What sets our VIEWIZ® applications apart from the rest is our signature AFFS technology. Created a decade ago by BOE, AFFS is continually being improved upon, and currently boasts five versions, with the fifth being the most advanced. What follows is a brief outline of the development of AFFS technology from Version I to V.

- AFFS Ver. V is the most recently developed technology by removing BM(Black Matrix) without Resin technology. It provides the best display quality to deal effectively with future ubiquitous and multimedia applications.
- With AFFS Ver. III pixel and material are optimized to increase white luminance, decrease darkness and reduce response time.
- AFFS Ver. II focuses on reducing power consumption and color shift, and increasing transmittance.
- AFFS Ver. I optimizes edge on pixel to enhance brightness.
- Using co-plane fringe field, FFS technology optimizes liquid crystal alignment to significantly increase transmittance.
BOE’s advanced R&D efforts led to the creation of AFFS – a technology that guarantees perfect display quality and extended user time anytime, anywhere.

Technological Features of AFFS

- Improved control over liquid crystals through the use of nanoscale electric field
- Optimized use of electrode design
- Increased aperture ratio and transmittance through the removal of BM(Ver.V)
- Modified nanoscale TFT structure to control power consumption
- Co-plane alignment of electric fields
- Use of transparent electrodes
The technological features improve color reproduction through increased transmittance, facilitate a wider viewing angle, guarantee faster response time and lower power consumption, and ensure greater outdoor readability.

**AFFS**
(Advanced Fringe Field Switching)
- High transmittance
- Use of transparent electrode
- Low driving voltage
- Co-plane fringe field (Ey, Ez)
- 3 dimensional design using nanoscale electrode array
  \( d_{\text{ITO}} \leq 40 \text{nm}, d_{\text{SiN x}} \leq 400 \text{nm} \)

**S-IPS**
(Super-In-Plane-Switching)
- Low transmittance
- Use of metal electrode
- Higher driving voltage
- In-plane field (Ey)

**PVA**
(Patterned-ITO Vertical Alignment)
- Higher driving voltage
- Vertical field (Ez)
Exceptional Visibility for Indoor and Outdoor Mobile Device Use

Our mobile device applications show superior performance under all lighting conditions, including sunlight, with increased color reproduction reached through the sharpening of dark colors and the brightening of white. By reducing reflection ratio, a perfect 180 degree indoor wide viewing angle is realized, and the use of transparent electrodes boosts transmittance. The combination of increased transmittance and improved contrast ratio guarantees the easy readability and visibility required for mobile phone use.
**Sunlight Visibility**

AFFS provides a high contrast ratio, high transmittance, and limits surface reflection for excellent indoor and outdoor viewing and clear imaging.

![Sunlight Visibility Diagram](image)

**Low Power Consumption**

AFFS’ mobile application reduces power consumption 30% lower than that of TN.

![Low Power Consumption Graph](image)

<table>
<thead>
<tr>
<th>2.0”QVGA (202ppi)</th>
<th>AFFS</th>
<th>TN</th>
<th>VA</th>
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<td>13.8</td>
<td>15.5</td>
<td>24.1</td>
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<tr>
<td>Black</td>
<td>7.7</td>
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<table>
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<th>2.2”QVGA (182ppi)</th>
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<td>&gt;24</td>
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<tr>
<td>White</td>
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<td>17.95</td>
<td>&gt;25</td>
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<tr>
<td>Black</td>
<td>12.85</td>
<td>20.10</td>
<td>16</td>
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Superior Ubiquitous Solutions

The AFFS technology applied in VIEWIZ® tablet applications ensures perfect readability in any environment, even under bright sunlight, and allows you to enjoy the entertainment longer with low power consumption, high brightness, and a fast response time.

Our 180 degree wide viewing angle, improved contrast ratio and higher white levels, increase the clarity of your picture, and guarantee flawless viewing from any angle you choose.

No matter where you are or what you need, BOE makes mobile computing easy and convenient.
**Fast response time**
A faster response time and higher brightness allow the tablet using area to be expanded to include such functions as ubiquitous mobile computing, DMB and gaming.

**Scratch Prevention**
The AFFS-applied tablet PC has an innovative hard-coated single surface that prevents light refraction and enables direct contact and precision pointing without rippling.

**Greater outdoor readability**
Outdoor readability is significantly improved through lowering the reflectance level of the panel surface. (<1% at white and <0.5% at black)

**White Reflectance**
- AFFS Ver. II
- AFFS Ver. III

**Black Reflectance**
- AFFS Ver. II
- AFFS Ver. III

<table>
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<th>White Recycle Ratio</th>
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<tr>
<td>Transreflective</td>
<td>~7%</td>
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<tr>
<td>TMR Pol. Apply</td>
<td>3.5% - 5%</td>
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<tr>
<td>AFFS</td>
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Comparison of reflectance of AFFS Ver. II vs. AFFS Ver. V
Additional Advancements Necessary for High-End Notebooks

The greatest benefit of a notebook is the freedom of mobility. BOE has created notebook applications that consume less power without compromising its 700:1 contrast ratio and 25ms response time. These features translate into longer periods of cordless freedom for the end-customer.

More than 200 nits increase brightness while power consumption of 5.4W (15” SXGA+) achieves a 20% lower intake than TN consumption for efficient energy use.

Low Power Consumption

Notebook applications with AFFS Ver. III have higher transmittance than IPS with a 30% lower driving voltage.
Display for Professionals

VIEWIZ™ high-end notebook applications offer sharper, clearer images through their wide viewing angle and high contrast ratio.

![Normal vs AFFS comparison](image)

Increase Transmittance

AFFS Ver.V increases transmittance by 20% compared to AFFS Ver.II

![Transmittance graph](image)

Increased Color Reproduction

Towards extreme wider viewing angle, AFFS’ color reproduction increases by 10% comparing to other modules’ drastic drop down.

![Color Reproduction vs Viewing Angle](image)

Comparison of Color Reproduction with Viewing Angle at Various LC Modes
Creates a Visual Impact with its Powerful Performance

Entertainment has its needs too. Gamers will find our fast response time and authentic color imaging a bonus to their gaming experience. Movie lovers and technology-advanced consumers will find VIEWIZ® LCD TV applications a picture perfect addition to their home.

Technology development has increased image and color response speed to 6ms. Gray to color response time has significantly improved due to AFFS technology.
Fast Response Time

With a faster response time, AFFS decreases “ghosting” effects and color shift for better motion visibility.

Authentic Color Reproduction

The extreme wide viewing angle enhances color reproduction to 80% and reduces color shift to 0.015.
Customized Differences with the Same Quality Display

Depending on the needs of our client manufacturers, our specialized applications are created to optimize the features most beneficial to their respective customers. Some end uses for our specialized applications include interactive information kiosks, aviation and car navigation displays, medical monitors, and auto mechanic analysis devices.

We guarantee customized applications, that deliver the same quality performance and reliable durability found under the VIEWIZ® label.

Visibility for Medical Applications

Under extreme conditions, AFFS offers an incomparable contrast ratio of 1000:1 and brightness of 800 nits while maintaining high visibility. In addition to monochrome lines for medical use, color LCD modules have been developed with a brightness of 400 nits.
AFFS Durability for Avionics & AV Applications

The images compare the screens under temperature conditions higher than 45°C, high humidity, vibration, and sunlight.

- Expanded product lines from 3.5” (VGA) to 12.1” (WXGA)
- Incomparable Contrast Ratio > 1000:1 and Brightness > 800nits
- Increased Visibility ≥ 10% with optimized Color Reproduction and Viewing Angle
- Reduced Color Shift at 45°C ≤ 0.04
- Fast Response Time at 45°C (G-t-G) ≤ 16ms
- Minimized Black Color Shift by optimizing polarizer > 45°C
- Ultra low reflection < 0.5%
Displaying Success

The World's Most Advanced Digital Displays
“Some of the world’s most advanced digital displays now come from Korean makers like BOE.” --- Business Week

Display Innovations
“As notebook PCs become ubiquitous for computing, entertainment, and communication, the need for improved visual performance and longer battery life become paramount. The innovations by BOE clearly point to a future where brighter, higher contrast, and wider viewing angle displays are possible while keeping both the cost and power consumption down.” --- Intel

Editor's Choice: BOE Wide Angle Displays
“However, the biggest news of the year was the emergence of dual wide angle LCD displays with both vertical and horizontal viewing angles of nominally 160 degrees, but actually approaching a full 180 degrees. This makes a HUGE difference in Tablet PC readability, especially when used in portrait mode.” --- Tablet PC Magazine

Editors’ Choice
“So we’re happy to heap some praise on Motion Computing’s M1400. This is the first slate with a 12.1-inch screen to eliminate the bad viewing angle, providing crisp, colorful images no matter which way you look at the screen. Once you check out the M1400, our new Editors’ Choice, you won't want another model.” --- PC Magazine

You Won’t Believe the Difference
“Finally, and perhaps most importantly, Hewlett Packard was smart enough to snap the sensational BOE display… You won't believe the difference between this display and a standard LCD until you see it.” --- Pen Computing

The Customer is Always Right
“Hardware-wise the ST5010 will be as close to “perfect” as the M1400VA once it receives the BOE display.” --- Tablet PC Buzz Forum

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