

# DISPLAY SOLUTIONS BROCHURE

WPGA Embedded Display Solutions Group focuses on the design , value-add and integration of products to support the embedded display market. We are proud to partner with the world's leading companies in display technologies and peripheral products.



A Member of WPG Holdings



**WPG Americas Inc.**

# TOUCH SCREENS

WPG Americas offers a broad array of touch screen solutions and we are happy to design a custom solution to meet your needs. WPGA supports the following touch technologies:

Resistive (4-, 5-, 7- and 8-wire)  
Capacitive & Projective Capacitive

## FILTERS

### Anti-Reflective (AR) Coated Glass

The Multi-Layer Vapor Deposition Coating on Anti-Reflective Coated Glass is designed to minimize reflectance and maximize transmittance.

### Anti-Glare (AG) Glass Matte Finish

AG Glass with Matte Finish is chemically etched glass that has a slightly textured finish, either on one side or both sides, reducing reflection by scattering light directed on its surface. This softens the image of direct light sources visible in the reflection of the viewing area.

### EMI/RFI Shielding

This ITO conductive coated glass has conductivity levels ranging from 5 Ohms/sq to 350 Ohms/sq. A typical EMI/RFI shielding value for LCD display is approximately 9-15 Ohms/sq at 89% visible light transmission. Transmission is reduced as the Ohms/sq level drops.

### Thermal Overloading

R blocking filters are designed to reduce the thermal loading on LCDs used in direct sunlight, such as in marine, military, outdoor signage applications, etc. By significantly reducing the transmission of near-infrared and infrared radiation, IR filters reduce electronic display temperatures when exposed to direct sunlight and elevated thermal loading. This also minimizes display "brown out".

### Protective Filters

Optical grad substrates used to manufacture filters include polycarbonate Lexan®, acrylic, Plexiglas®, glass and other transparent materials. Substrates are selected based on their optical and mechanical properties, their cost and the intended application where the filter will be used.

### Vandal Shield

Can either be a film applied to the LCD glass, touch screen, or a sheet of protective polycarbonate taped to the surface of the LCD. Vandal Shield applications help to protect LCD panels in environments where the display is unprotected or unsupervised.

## OPTICAL BONDING

Optical bonding is an adhesion process to bond two or more optical components. The key benefits of optical bonding include improved viewing angle, brightness and contrast, no condensation and moisture between LCD and overlay, and improved durability and ruggedness (shock and vibrate). Typical overlays include touch screens, contrast enhancement filters, EMI/RFI filters, vandal shields and thermal heaters.

## TRANSPARENT HEATERS

Transparent heaters are transparent substrates with electrically conductive coatings. They can be integrated internally or externally depending on your application.

# EXTERNAL FILMS

## Anti-Reflective (AR) Film

AR Film reduces surface reflection on the front of the LCD panel, which increased the effective brightness and contrast of the display by two to three times without actually making the display any brighter.

## Anti-Reflective/Anti-Glare (AR/AG) Film

The AR/AG Film offers the same effect as the AR film (above), but the AG softens the direct light source images in reflection.

## Hydrophobic

The hydrophobic coating is water repellent and bonds with the glass to create a barrier against dirt, dust, grease, liquid, salt spray, etc. In other words, it is an “easy clean” solution. The hydrophobic coating can be applied as a stand-alone solution or in combination with other enhancements, such as touch screens, AG coatings, privacy filters, etc. The hydrophobic coating will not optically change the LCD panel.

## IR / Heat Reduction

The IR/Heat Reduction films are designed to reduce heat loading on the display surface for outdoor display applications.

## Privacy Films

As their name states, Privacy Films are view control films designed to keep sensitive information private.

## Blur

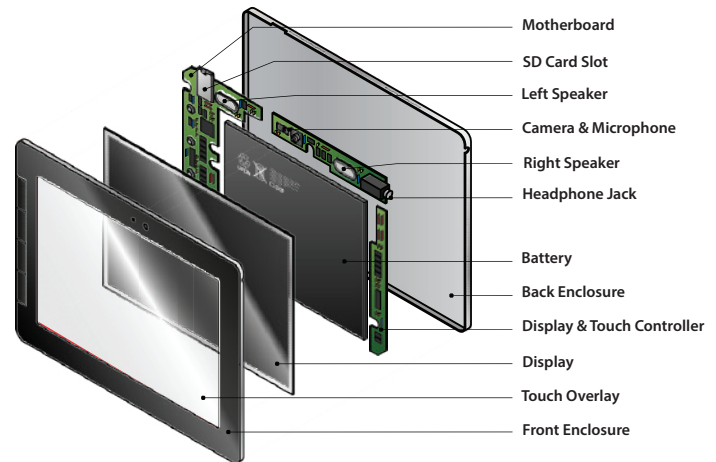
This film blurs the image when viewed 30 degrees from left or right.

## Louver

The Louver Film causes the image goes black when viewed 30 degrees from left or right. It also reduces light directed in non-viewing angles to reduce reflections and lighting of surrounding areas, such as cockpit or darkened rooms.

## Circular Polarizer

The Circular Polarizer is a linear polarizer with a 1/4 wave retarder laminated to the rear surface, which improved contrast of the display. Any light entering the filter from the front has the reflection internally “twisted” so there is no returned light, eliminating back surface reflections.



## CUSTOM ELECTRONICS

WPG Americas Inc. is proud to design and develop the necessary electronics required to drive your display project per your requirements.

## ENCLOSURES

WPG Americas, Inc. can assist you in developing your display solution with any type of enclosure that is deemed appropriate for the application.

## GET IN TOUCH



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[www.wpgamericas.com](http://www.wpgamericas.com)



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# NIGHT VISION IMAGE SENSING (NVIS)

The primary use of night vision filters is in military electronic and lighting applications. By reducing NIR radiation, night vision goggles (NVG) can be used with electronic display and lighting systems without affecting the nighttime sensitivity of the NVIS. Secondary filtering operations such as EMI/RFI shielding, anti-glare/anti-reflective coatings or contrast enhancement can also be added to the night vision filters.

54° 25' 30" N - 18° 39' 15" E

## FILM STACK ENHANCEMENTS

### Daylight Readable

(Transflective Polarizer Film)

The semi-reflective coating on the rear surface turns a standard TFT LCD panel into a transflective panel, offering better direct sunlight.

### Brightness Enhancement Film

(BEF II or BEF III Film)

Brightness Enhancement Film increases panel brightness by 60% with a single sheet and up to 120% with two crossed sheets. Reduces viewing-angle. BEF III is slightly lower cost and performance (59% and 111% respectively) but also reduces moire and wet-out of LCD displays.

### Dual Brightness Enhancement Film

Embossed Film (DBEF- E Film)

The Dual Brightness Enhanced Film captures and recycles light that's normally lost through absorption in the rear polarizer, offering up greater efficiency and performance. This film increases panel brightness approximately 63% for a slab type light guide and 97% for a wedge type light guide, which is used in smaller displays.

### ¼ Wave Retarder

Helps with the effect of twisting polarized light waves, enabling easy viewing with sunglasses.

### Dual Brightness Enhancement Film

Matte Film (DBEF- M Film)

The matte finish on the Dual Brightness Enhancement Film improves display uniformity, hides minor cosmetic imperfections, eliminates wet-out and reduces reflective moire.

## BACKLIGHT ENHANCEMENTS

### CCFL Backlight Enhancement

CCFL Backlight Enhancements can significantly increase the overall brightness of the LCD display. This does, however, mean an increase in power as well. The CCFL Backlight Enhancement is ideal for outdoor applications.

### LED Backlight Enhancement

LED Backlight Enhancement provides increased brightness associated with low power, variable dimming options and instantaneous start (even in extreme temperatures). LED Backlight also eliminates the inverter, improving EMI emissions as a result.

# DISPLAY SOLUTIONS FORM

## CONTACT / PROGRAM INFORMATION

Date _____	Contacts	Name	Email	Program Name _____
Customer _____	Engineering	_____	_____	RFQ QTY's _____
Website _____	Purchasing	_____	_____	Sample Date _____
_____	_____	_____	_____	Prototype Date _____
Current Competition _____	WPGA Sales	_____	_____	Production Date _____ Qty _____

## DISPLAY SPECIFICATIONS

1. What type of LCD is required? TFT \_\_\_\_\_ OLED \_\_\_\_\_ Passive \_\_\_\_\_ Graphic Module \_\_\_\_\_ Character Module \_\_\_\_\_
2. Type of Display? Transmissive \_\_\_\_\_ Transflective \_\_\_\_\_ Reflective \_\_\_\_\_
3. Resolution (e.g. 1024x768 XGA)? \_\_\_\_\_
4. Diagonal size of the display (e.g. 3.5", 7.0", 10.1")
  - a. Viewing angle requirement \_\_\_\_\_
5. Brightness requirement (e.g. 350 Nits, 1200 Nits)? \_\_\_\_\_
  - a. Display will be primarily used Indoors \_\_\_\_\_ Outdoors \_\_\_\_\_ Both \_\_\_\_\_
6. What interface? ARGB (standard PC input) \_\_\_\_\_ NTSC/PAL video \_\_\_\_\_ DVI \_\_\_\_\_ TTL \_\_\_\_\_ LVDS \_\_\_\_\_ HDMI \_\_\_\_\_ SPI \_\_\_\_\_ MCU \_\_\_\_\_ Display Port \_\_\_\_\_ SDI \_\_\_\_\_
7. Contrast ratio requirement (e.g. :500:1)? \_\_\_\_\_
8. Any low power requirements (Battery)? Y  N
9. Does AR tempered glass need to be bonded to the front of the display? Y  N
10. Do you need any value-integration for your project or design? Y  N

## DISPLAY VALUE ADD

### TOUCH SCREEN SPECIFICATIONS

1. Touchscreen Resistive 4-wire \_\_\_\_\_ 5-wire \_\_\_\_\_ 8-wire \_\_\_\_\_ IR/Other \_\_\_\_\_
2. Touch screen Capacitive: Single Touch \_\_\_\_\_ Multi Touch \_\_\_\_\_
3. Touch controller 3 V input \_\_\_\_\_ 5 V input \_\_\_\_\_ or 12V input \_\_\_\_\_ USB \_\_\_\_\_ or Serial \_\_\_\_\_
4. Integrate touch screen onto LCD? Y  N 
  - a. Does the touch screen need to be fully bonded to the display? Y  N
  - b. Special touch? Finger  Pen  Tool  Glove
5. Is a front gasket required? Y  N 
  - a. Any special material specification? Y  N

### TOTAL SOLUTIONS

1. Is a single board computer required to drive the display? Y  N
2. Is an open frame or rack mount enclosure required? Y  N
3. Is a waterproof front seal or enclosure required? Y  N
4. Is High Bright (Daylight viewable) LED backlighting required? Y  N
5. Are there any other size/package/dimension requirements? Y  N
6. Do you need anti-reflective film (AR), EMI filtering, vandal protection? Y  N

### DISPLAY CONNECTION KITS

1. Control circuit for LED's required? Y  N
2. Is a display data interface cable required? Y  N
3. Is an Analog to Digital controller card required? Y  N
4. Do parts need to be kitted or labeled with their part number? Y  N

**WPG America can work closely with you to develop a custom solution that meets your needs. Demo units may be available for evaluation.**

**Inquire today!**



# WPGA TOTAL SOLUTIONS | BY PRODUCT

<p><b>ANTENNAS</b> Abracon Adam Tech Vitraron / Vishay</p> <p><b>AUDIO</b> NJR Semelab / TT Electronics</p> <p><b>CAPACITORS</b> BCcomponents / Vishay Jaro KEMET Pilkor / World Products Inc. Roederstein / Vishay Sprague / Vishay Tansitor / Vishay Vitraron / Vishay World Products Inc.</p> <p><b>CIRCUIT PROTECTION</b> Abracon BCcomponents / Vishay KEMET ProTek Devices Taiwan Semi Vishay Semiconductors World Products Inc.</p> <p><b>COMPUTER HARDWARE &amp; PERIPHERALS</b> Supermicro</p> <p><b>CONNECTORS</b> AB Connectors / TT Electronics Abracon Adam Tech BJB Ideal Industries Vishay</p> <p><b>DIODES, MOSFETS &amp; TRANSISTORS</b> General Semiconductors / Vishay MPS ProTek Devices Semelab / TT Electronics Siliconix / Vishay Taiwan Semi Vishay Semiconductors World Products Inc.</p>	<p><b>DISPLAY PRODUCTS</b> Aaeon Digital View EDT ERG FDI FEMA ICS Innolux Mitsubishi Electric Newhaven Display Samsung Semiconductor Sharp Microelectronics Tianma America, Inc. Vishay WiseChip</p> <p><b>EMBEDDED BOARDS</b> Aaeon Advantech FDI iEi Onyx Healthcare</p> <p><b>ENCODERS</b> BI Technologies / TT Electronics MCB/Vishay TOCOS</p> <p><b>FANS &amp; BLOWERS</b> Jaro NMB</p> <p><b>FPGA</b> Achronix Lattice</p> <p><b>FREQUENCY</b> Abracon Cardinal NDK NJR</p> <p><b>INDUCTORS, MAGNETICS &amp; TRANSFORMERS</b> Abracon BI Technologies / TT Electronics Dale / Vishay Jaro KEMET Vishay</p>	<p><b>LASER DIODES</b> OPTEK / TTE</p> <p><b>LIGHTING CONTROLS/ LED DRIVERS/MODULES</b> AC Electronics Artesyn Autec Power Systems Cree LED ENEDO ERG ERP Jaro Kinetic LSI / CSI McWong MPS NJR OSRAM DS Powerland Richtek Samsung LED Taiwan Semi Vishay</p> <p><b>LINEAR, ANALOG &amp; MIXED SIGNAL</b> Kinetic LSI / CSI MPS NJR Richtek Siliconix / Vishay Taiwan Semi Vishay</p> <p><b>MCU/MPU/ PERIPHERALS</b> NJR</p> <p><b>MEMORY / STORAGE</b> Alliance Memory AMC Optics Approved Memory Crucial Giantec Greenliant Kingston Micron Netsol Samsung Semiconductor Smart Modular Winbond Wintec</p>	<p><b>NETWORKING</b> Artesyn Bel Power NMB</p> <p><b>OPTICAL SOLUTIONS - LIGHTING</b> AMC Optics Bright View Carlo Optics Gaggione LEDIL Polymer Optics Vishay</p> <p><b>OPTO/LEDs/MODULES</b> CREE Idea, Inc. Kingbright Company LLC NJR OPTEK / TTE OSRAM DS Samsung LED Vishay World Products Inc.</p> <p><b>POTENTIOMETERS</b> BCcomponents / Vishay BI Technologies / TT Electronics MCB / Vishay Sfernice / Vishay Spectrol / Vishay TOCOS Vishay</p> <p><b>POWER SUPPLIES &amp; ADAPTORS</b> AC Electronics Artesyn Autec Power Systems Bel Power COSEL USA ERP OSRAM DS Powerbox Powerland Protek Power Sparkle Power</p>	<p><b>PRINTERS</b> Nakagawa (Thermal Paper)</p> <p><b>RELAYS</b> DRI Relays KEMET NEC TOKIN / World Products Inc. Vishay World Products Inc.</p> <p><b>RESISTIVE DEVICES</b> Angstrohm / Vishay Beyschlag / Vishay BCcomponents / Vishay BI Technologies / TT Electronics Dale / Vishay IRC / TT Electronics Jaro MCB / Vishay Sfernice / Vishay State of the Art Thin Film / Vishay TOCOS Vishay Precision Group / VPG Welwyn / TT Electronics</p> <p><b>RF &amp; MICROWAVE</b> Abracon Adam Tech Cermetek NJR Semelab / TT Electronics</p> <p><b>SENSORS</b> Aceinna Advantech KEMET NJR OPTEK / TTE Pixart Socle Taiwan Semi TOCOS Vishay</p> <p><b>SOLID STATE BATTERIES</b> Cardinal Components</p>	<p><b>SWITCHES</b> OPTEK/TTE TOCOS</p> <p><b>TELECOM</b> Bel Power NMB Vishay</p> <p><b>THERMAL</b> ATS Cooliance Jaro NMB</p> <p><b>TIMING DEVICES</b> Abracon Cardinal Components NDK NJR</p> <p><b>TOUCH SCREENS</b> Dale/Vishay EDT Fujitsu Newhaven Display Tianma America, Inc. WiseChip</p> <p><b>WIRELESS</b> Abracon AcSIP Advantech AzureWave Cermetek Janus Jorjin</p>
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# WPGA TOTAL SOLUTIONS | BY SUPPLIER

<p><b>A</b> Aaeon AB Connectors / TT Electronics Aceinna AC Electronics Achronix AcSIP Abracon Adam Tech Advantech Alliance Memory AMC Optics Angstrohm / Vishay Approved Memory Artesyn ATS Autec Power Systems AzureWave</p> <p><b>B</b> BCcomponents / Vishay Bel Power Beyschlag / Vishay BI Technologies / TT Electronics BJB Bright View</p>	<p><b>C</b> Carlo Optics Cardinal Components Cermetek Cooliance COSEL USA Cree LED Crucial</p> <p><b>D</b> Dale / Vishay Digital View DRI Relays</p> <p><b>E</b> EDT ENEDO ERG ERP</p> <p><b>F</b> FDI FEMA Foil Resistors / VPG Fujitsu</p>	<p><b>G</b> Gaggione General Semiconductors / Vishay Giantec Greenliant</p> <p><b>I</b> ICS Idea, Inc. Ideal Industries iEi Innolux IRC / TT Electronics</p> <p><b>J</b> Janus Jaro Jorjin</p> <p><b>K</b> KEMET Kinetic Kingbright Company LLC Kingston</p>	<p><b>L</b> Lattice LEDIL Link Labs LSI / CSI</p> <p><b>M</b> MCB / Vishay McWong Micron Mitsubishi Electric Monolithic Power Systems/ MPS</p> <p><b>N</b> Nakagawa Manufacturing NDK Netsol Newhaven Display NJR NMB</p> <p><b>O</b> Onetouch Onyx Healthcare OPTEK / TTE OSRAM DS</p>	<p><b>P</b> Pixart Polymer Optics Powerbox Powerland ProTek Devices Protek Power</p> <p><b>R</b> Richtek Roederstein / Vishay</p> <p><b>S</b> Samsung Semiconductor Samsung LED Semelab / TT Electronics Sfernice / Vishay Sharp Microelectronics Siliconix / Vishay Smart Modular Socle Sparkle Power Spectrol / Vishay Sprague / Vishay State of the Art Supermicro</p>	<p><b>T</b> Taiwan Semi Tansitor / Vishay Thin Film / Vishay Tianma America, Inc. TOCOS TT Electronics</p> <p><b>V</b> Vishay Vishay Precision Group / VPG Vitraron/Vishay</p> <p><b>W</b> Welwyn / TT Electronics Winbond Wintec WiseChip World Products Inc.</p>
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