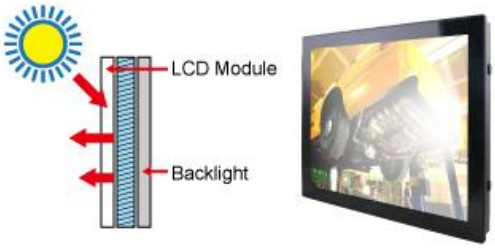
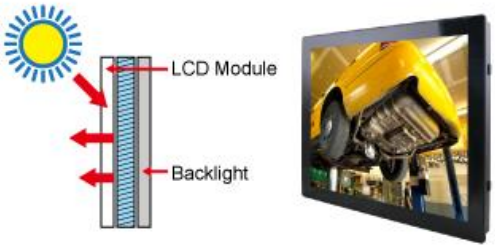
Sunlight Readable

On an average sunny day, the illumination of ambient daylight is approximately 30,000 nits, in order to make it clear image for an outdoor application, the panel brightness must reach at least 900 nits, as more and more LCDs display find their way to meets outdoor usage, the need becomes far greater for them to not only be able to withstand serve extreme temperature, but also be readable when exposed to direct or indirect sunlight, glare and reflection.
Most of the panel displays are not properly equipped to handle above condition. Avalue offers several kinds of brightness enhancement solutions to our customer requirement, especially for outdoor application need. To respond the challenge of brighter display, LED backlighting has been developed to achieve and maintain the required brightness levels.
Avalue provided active brightness enhancement up to 1500nits, the high brightness is to ensures excellent visual readability under any lighting condition.



Non-Sunlight Readable



Sunlight Readable

Benefit

- Improve display contrast and readability
- Improve display clarity and image quality
- Superior uniformity
- Improved operating temperature range and brightness
- Low power consumption
- Enhance color saturation and view angle
- Full mechanical and electronical compliance with current system

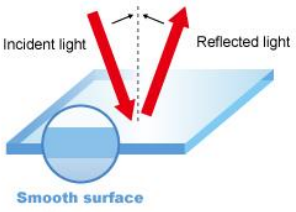
Surface Coating

Avalue provide 3 different choices of surface coating for PCAP touch, these technologies included Anti-Reflection, Anti-Glare and Anti-Finger print, it can be widely used at indoor and outdoor environment by enhancing optical performance of displays.

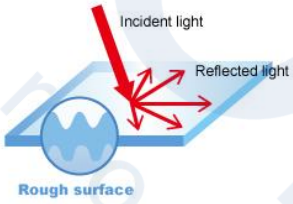
Anti-Glare (AG) treatment

There are 2 different kind of treatment for glass with Anti-Glare processing. A chemical-based surface treatment (chemical AG process) is applied directly to the surface of glass to form micro asperities and give the glass an anti-glare effect under the likes of sunlight. It does not generate any of the minute flaws (micro-cracks) that are characteristic of mechanical AG processes and therefore maintains the high surface strength of the glass.
The other way for AG treatment is manufactured by controlled acid etching process yielding uniform diffused surfaces for anti-glare. Varying levels of diffusion specified as gloss yield different levels of reduced glare. A lower gloss reading denotes a more diffuse panel. The haze ratio of AG glass used on OGS touch screen products cannot be too high, because high levels of haze would affect LCM transmittance. See below figure to have more understanding on specification categories for anti-glare glass.

AG Glass	Cell Phone (OGS)	Monitor/NB (OGS)	Cover Lens
Haze (%)	1.0 ~ 3.0 ± 0.5	3.0 ~ 5.0 ± 0.5	70 ~ 30 ± 5
Gloss Unit (GU)	85 ~ 95	80 ~ 90	10 ~ 50
Ra (Roughness)	< 0.2	< 0.4	0.4 ~ 1.5
Transmittance (%)	90 ~ 95	85 ~ 90	80 ~ 90



Without AG Processing



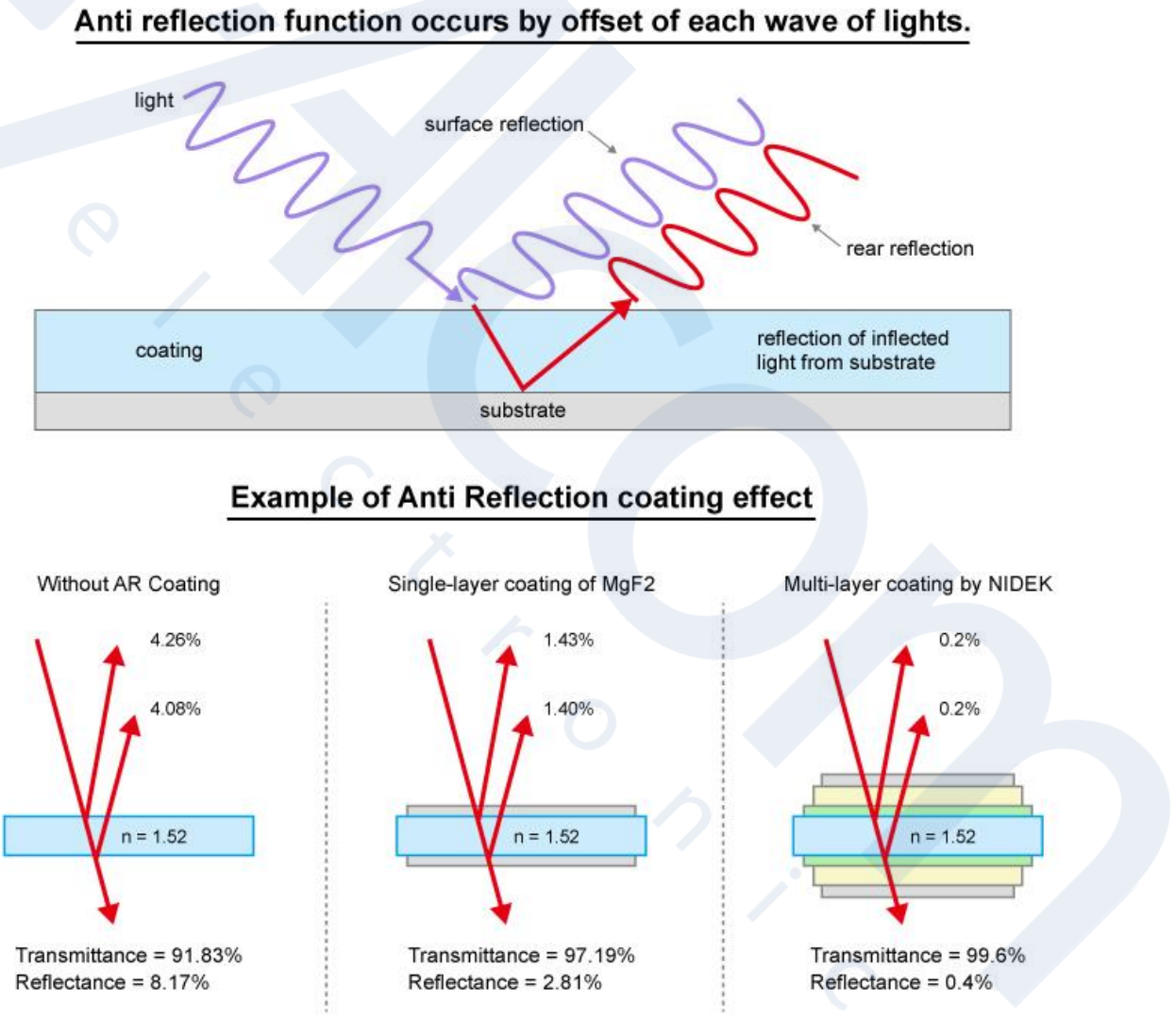
With AG Processing

Outlook different between AG and non-AG coating

Comparison between different haze percentage.

Anti-Reflection

An Anti-Reflection (AR) coating is a type of optical coating applied to the surface and other optical elements to reduce reflection by vacuum evaporation process. In typical imaging systems, this improved the efficiency since less light is lost due to reflection. In complex system such as telescopes and microscopes the reduction in reflections also improves the contrast of the image by elimination of stray light.
AR produced destructive interference in the beams reflected from the interfaces and constructive interference in the corresponding transmitted beams, which in creases the transmittance of glass or transparent substrates, the transmittance of glass is approximately 91%, with single sided coating the transmittance can increase to 94~95%, if with double sided coating it can increase transmittance up to 98~99%.



(Principle of Anti-Reflection coating)

Anti-Fingerprint (AFP)/ Anti-Smudge (AS)

The Anti-Fingerprint coating constructions of the preferred embodiments advantages like user is prevented from being imprinted on the surface and it remain clean and aesthetically pleasing. AFP coating makes it possible to wipe up smudge on surface very easily and also has a great hydrophobic performance and protects AR layers and reduced friction and low surface energy and improves scratch resistance. The hydrophobic performance is evaluated each lot by measuring contact angle. The AF effect is realized by applying a nano-coating to reduce the optical contrast of fingerprints. The AFP effect means that fingerprint on the surface cannot be seen at all by the naked eye, or only very slightly. Although the fingerprint is actually on the surface, it is essentially “invisible”. The color to be coated under visible and infrared light is transparent. Coating is with characteristics like low coefficient of friction, contact angle >100 degree. It utilizes a vacuum coating process which is also thinner and more even than spread coating. The degree of environment pollution is the lowest.

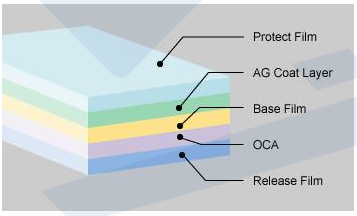
With AF Coating Without AF Coating

Benefit

- Very low surface reflections
- High transmission for visible wavelengths
- No ghost images, phantom light, or double laser beams
- Low light absorption
- High abrasion resistance and coating adhesion

Surface Protective Film

Glass is often considered the weakest point of PCAP touch products. It can be break under number of situations, including extreme weather, vandalism and occasional “out of bounds” accident usage. To minimize damage from break-in or other disaster, protective film can be installed to make cover lens harder to break and increasing security. Even when attempting to shatter glass panel, the security film will hold the glass in lace, reducing the overall impact of the breakage.
The working principal for Anti-Glare, Anti-Reflection film are same as coating process. They both gain optical benefits, AG films that reduce the sparkling of high-definition displays such as LCD. AG films with AR function that can reduce the glare of display with hue kept neutral. Clear AR films with enhanced scratch resistance caused by everyday use. Smooth contact AG films that allows fingers to glide across the surface.



Anti-Vandal film works by protecting the glass substrate from damage and can be easily removed and replaced by new film. This provides a quick on cost-effective solution for those required to maintain public and private spaces from the damage and visual distortion caused by graffiti and reckless vandalism.
Anti-UV film is applied for Panel PC which is working at outdoor or semi outdoor application. Even though that is indirect sunlight for touch surface, there are still ultraviolet light can damage the structure of touch and cause OCA film yellowing and aging issues. With Anti-UV film, we can prevent above undermine and extend the use of life for outdoor products. It also reject up to 97% of infrared light come from sunlight and insulation up to 60% of the heat keep touch surface and system away from heat issues.

	PR20	PR40	PR50	PR60	PR70
Visible Light Transmitted	21%	39%	50%	60%	69%
Visible Reflection Exterior	6%	7%	8%	8%	9%
Visible Reflection Interior	5%	7%	7%	8%	9%
UV Rejection	99.9%	99.9%	99.9%	99.9%	99.9%
Total Solar Energy Rejected	62%	60%	56%	53%	50%

Benefit

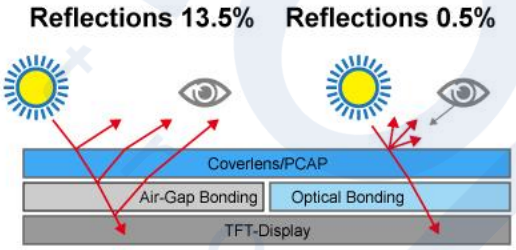
- Perfect adhesive performance with perfect adhesion, holding power and long-lasting protection
- Suitable hardness provides scratch resistance
- To prevent graffiti and vandalism interrupt to touch surface
- Anti-UV and infrared light protection for outdoor application

Bonding Technology

In normal practice for industrial panel PC, there are 2 main bonding technologies applied, air gap bonding uses a framed adhesive with a gasket that leaves behind a small air bubble in the part stack up. This is a popular bonding capability for devices because of its lower cost than other bonding options. It also presents challenges in product design when the layers are integrated with a gasket and an air gap is formed, it can be difficult to read the screen in bright light and causes the product to be more susceptible to moisture damage and breakage.
To solve above situation, optical bonding technology plays an important role in the display while the installed at humidity, outdoor or harsh environment. With its proprietary materials and unique re-workable process, Avalue provides the most advanced and cost-effective optical bonding solution that enable sunlight readability and provide extra vandal resistance for outdoor displays.
Optical bonding can easily solve the issues customer might meets at critical environment like fog, mirror image on the display, lower panel brightness. By optical bonding technology reflection will become lower and make view angle clarity, it significantly improved readability of displays with standard brightness in sunlight.

Benefit

- Reduction of reflections at the interfaces inside stack-up
- Improvement of extrinsic contrast value
- Protecting the display from moisture and dust
- UV Protection & resistance (anti-UV, UV cut 3,000 hrs+)
- Extended temperature range (-50~105°C)
- Elimination of parallax from a flat viewing angle
- No water condensation & contamination
- Higher stability in bumps and falls and better impact production



Touch Mode change for PCAP

The majority of touch screens of today use is dominated by two technologies- Projected capacitive and Resistive touch. In embedded computing industries there are more and more designs choose PCAP touch to turn the surface in front of the display into a modern user interface.
Resistive touch screen was launched about 20 years ago, with lower cost benefit and pressure sensitive surface react to touch is varies from objects such as finger, gloves, pencils or tools, resistive touch still the popular choice for factory automation. The resistive touch suffers from reduced light transmittance in comparison with PCAP therefore decreases the sought-after brightness of the underlying TFT-LCD.
Resistive touch needs to calibration time by time, driver need for new installation, besides, surface of resistive touch has lifetime's issue. A direct contact between the finger and the PCAP touch sensitive surface is not needed for operation. A glass plate may be mounted as an outer transparent protective layer without interfering with the touch functionality. The choice of material and thickness of the plate may even protect the system from vandalism in public places. It's worth mentioning that the operating life of the touch screen generally is well over the operating life of the display.
Avalue has been develop touch mode change UI under Windows operating system, user can easily change touch mode just one click, no reboot require for the change, We provide maximum 3 different kinds of touch mode for user like water, snow, glove…etc. This customized service has increased the working efficiency for customer who need to install their Panel PC at different places.