

400nm

500nm

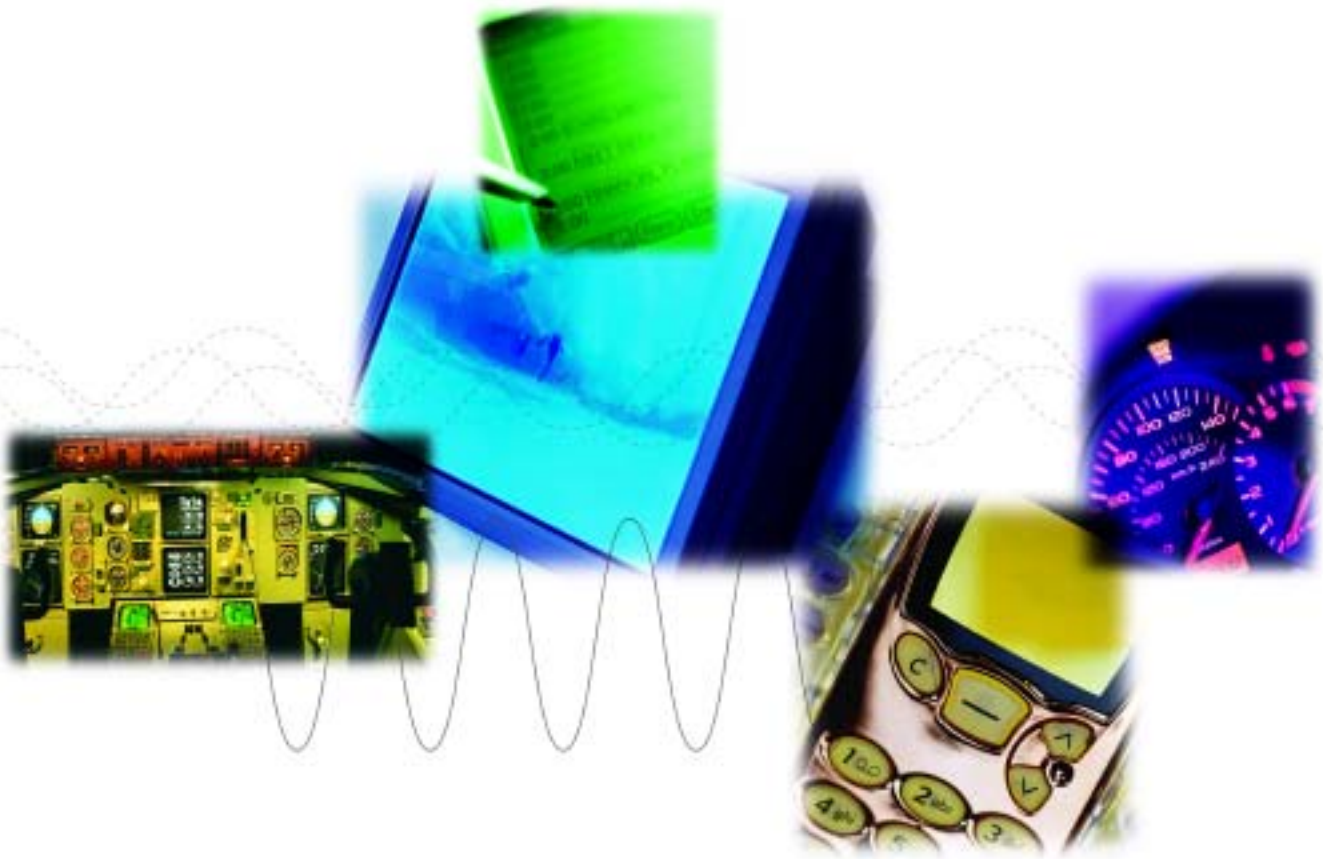
600nm

700nm

750nm

EMI SHIELDING WINDOWS

Product Information 063



Cut Glare and Improve Contrast



A Division of G&D Technologies, L.L.C.

Performance Coatings International's EMI Shielding Windows are designed to help your equipment comply with applicable Electromagnetic Compatibility Specifications and Standards. In addition, these windows provide optimum contrast enhancement for all types of displays, while at the same time reduce annoying glare and front-surface reflections. All EMI Shielding Windows are front-surface treated with Vueguard 901® to render them resistant to abrasion as well as many harsh chemicals and solvents. The vacuum-deposited conductive rear surface is protected by a transparent EMI Transguard coating to prevent fingermarking of the gold film and permit cleaning as required.

Options include front-surface screen printed legends and symbols which are protected from abrasion by the Vueguard 901® overcoat and rear-surface printed masks to conceal non-display areas behind the window.

Design Information

Substrate Color Selection—Fig.3, Item (1)

Product Information 065 provides technical data and the light transmission curves for the standard clear, gray, and colored window substrates. Select a substrate which will pass the maximum output of your display at the desired wavelengths. If color samples are required to help make this determination, contact your local PCI sales office.

Substrate Material Selection — Fig. 3, Item (1)

Once a color has been selected, then refer to Product Information 065 or 165 to determine material and thicknesses available for that color. Note: Only the acrylic or polycarbonate substrates can be employed in EMI Shielding Windows. Datasheet 065 provides information of optical and thermal properties of these materials.

Transparent Conductive Coating — Fig. 3, Item (2)

The thin, transparent, vacuum-deposited gold layer on the rear surface performs the EMI Shielding function, primarily, by reflecting incident radiated electromagnetic energy. Thus, the window passes the desired light within the visible spectrum while attenuating EMI at frequencies below it. Electrically, the shielding window presents a reflection barrier to EMI, reducing the equipment's unwanted emissions or its susceptibility.

The Total Shielding Effectiveness data for the EMI Shielding Windows is shown in Fig. 2. Testing was performed on an EMI Shielding Window covering a 2" x 10" aperture and gasketed to the test enclosure with a conductive silver-silicone elastomeric seal. Tests were performed by an independent test laboratory following the procedures of MIL-STD-285. The nominal resistivity of the conductive gold coating is 14 ohms/square.

Protective Coating Over Transparent Gold — Fig. 3, Item (3)

EMI Transguard was developed by PCI as a transparent protective overcoat to prevent permanent damage of the gold layer by fingermarking and to permit cleaning of the rear surface of the EMI Shielding Window, when necessary. It is standard for all windows.

Silver Acrylic Contact Surface — Fig. 3, Item (4)

To provide a low-impedance contact surface for conductive gasketing, a silver acrylic "buss bar" is screen printed directly onto the border of the window's gold film. The "buss bar" configuration may be specified to suit any mounting and gasketing techniques. If required, the "buss bar" can be extended from the rear-surface to the front-surface periphery for front-surface EMI gasketing.

Masks and Background (Optional) — Fig. 3, Item (5)

Many display windows are used to show a variety of information at one time. PCI's EMI windows can be provided with rear-screen printed opaque masks, which conceal all non-display areas.

Front-Surface Printed Graphics (Optional) — Fig. 3, Item (6)

Legends, symbols, and logos can be provided by front-surface screen printing on the substrate. Any color or color combination is available. PCI can generate your artwork, if needed.

Front-Surface, Protective, Anti-Glare Treatment — Fig. 3, Item (7)

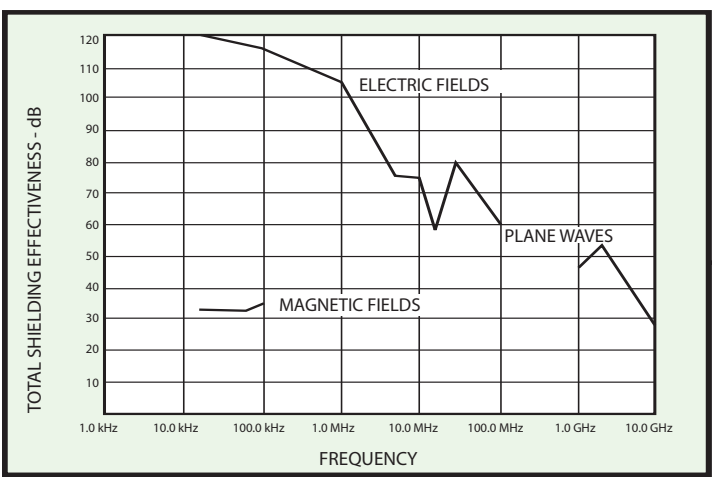
The durability of the exposed front surface of all PCI's EMI Shielded Windows is assured by the standard application of Vueguard 901®. The substrate whether with or without screen-printed graphics, receives this protective treatment as a standard. Refer to Vueguard 901® data sheet for specific abrasion and chemical resistance data.

This treatment provides superior anti-glare properties, while maintaining excellent resolution. It is also available in a high-gloss, water-clear finish.

- Reduce Radiated Electromagnetic Interference
- Optically Clear Overcoating Protects Vacuum-Deposited Gold
- Silver Buss Bar for EMI Gasket Contact Surface
- Resist Steel-Wool Abrasion
- Resist Chemicals & Solvents
- Cut Front-Surface Glare
- Enhance Contrast
- Maintain Character Resolution
- Available in Clear, Neutral Grays, & Colors
- Crisp, Front-Printed Graphics
- Selectively Printed Rear-Surface Masks
- Fully Fabricated, Ready to Install
- Water-Clear, High-Gloss Front Finish (Optional)

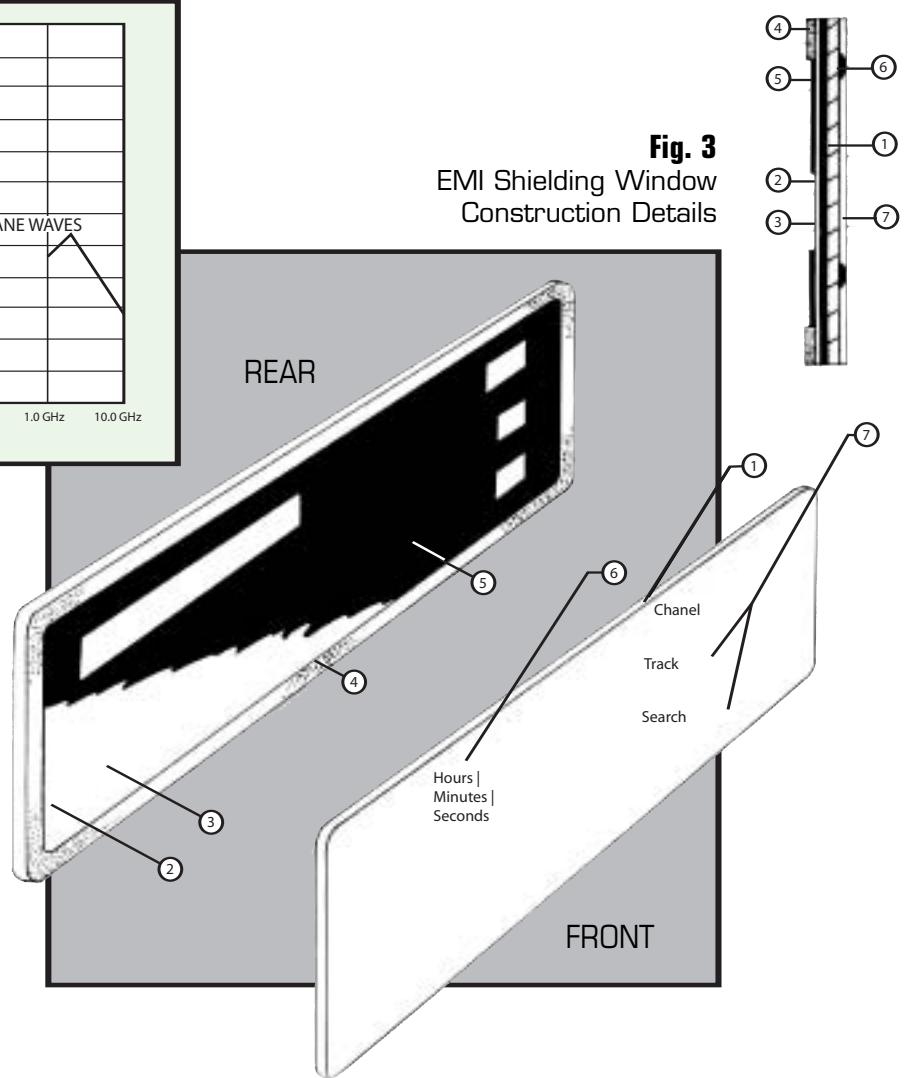
- LED
- Gas Plasma/ Discharge
- CRT
- Vacuum Fluorescent
- LCD, (TFT) – LCD
- Incandescent
- Fiber Optic
- Analog Displays
- Meter Faces
- Viewing Windows & Ports
- PDP, FPD

Fig. 2 Total Shielding Effectiveness vs. Frequency



1. Substrate – acrylic or polycarbonate.
2. Conductive coating – vacuum-deposited gold on substrate. $p \leq 14 \text{ ohm/sq.}$
3. EMI Transguard – transparent protective coating over gold film.
4. Silver acrylic buss bar – for EMI gasket contact.
5. Rear-screen printed opaque mask (optional)-conceals non-display areas.
6. Front-surface printed graphics (optional)
7. Vuegard 901® front-surface treatment—protects graphics and substrate from abrasion, solvents, and chemicals.

Fig. 3 EMI Shielding Window Construction Details



400nm

500nm

600nm

700nm

750nm

Overall Effect on Light Transmission

The combination of the front-surface protective anti-glare treatment, the rear-surface transparent conductive coating, and the protective coating over the transparent gold affects the light transmission of the window substrate material, within the visible spectrum, as shown in Fig. 4. This curve, together with the spectral curve for any clear or tinted substrate (Product Information 065), may be used to determine the nominal transmission of that substrate when employed as an EMI Shielding Window.

For example, from Product Information 065, the AQUA 49 material has nominal transmission of 50% at 500nm. From Fig. 4, it can be seen that at 500nm, the EMI window treatment will reduce the transmission to about 68% of the original value. Thus, the AQUA 49 employed as EMI Shielding Window will have a nominal transmission of $.50 \times .68 = .34$ or 34% at 500nm.

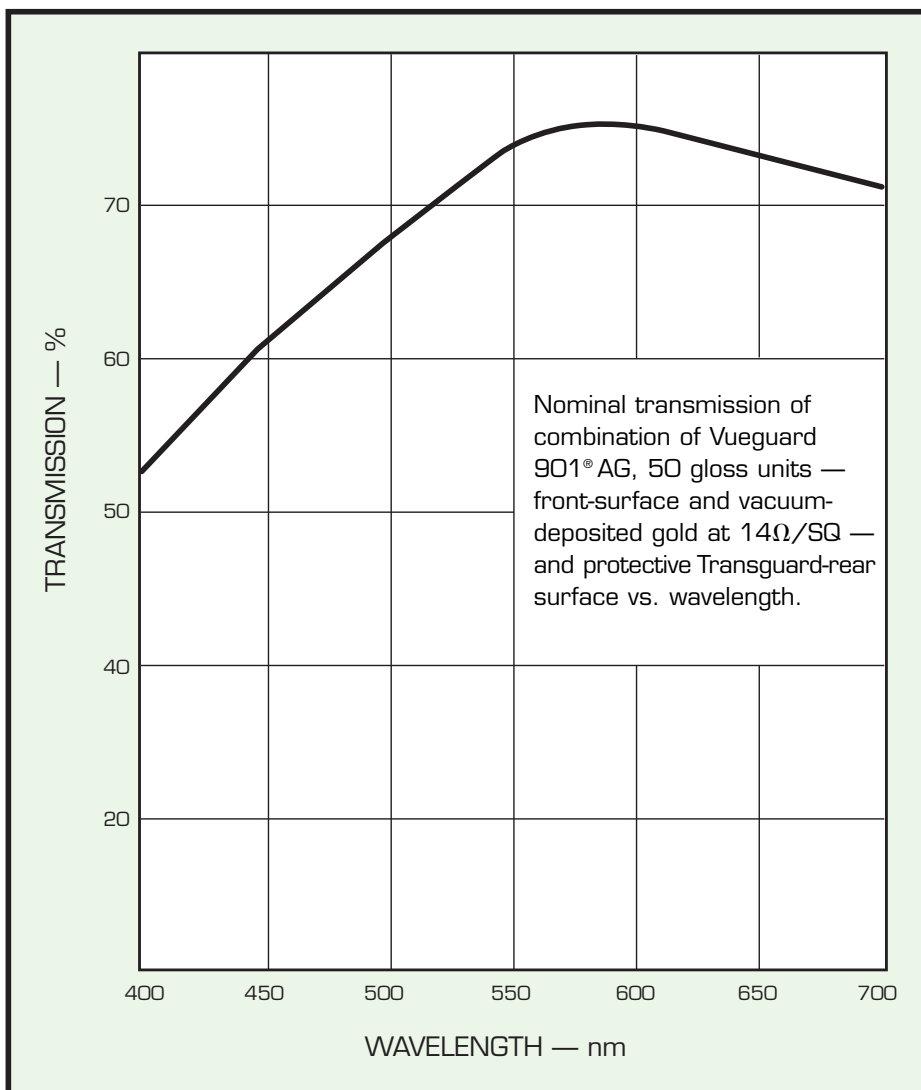


Fig. 4

Nominal Transmission of Conductive and Protective Coatings on EMI Shielding Window Substrates

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