EMI Shielded Windows & Contrast Enhancement Filters

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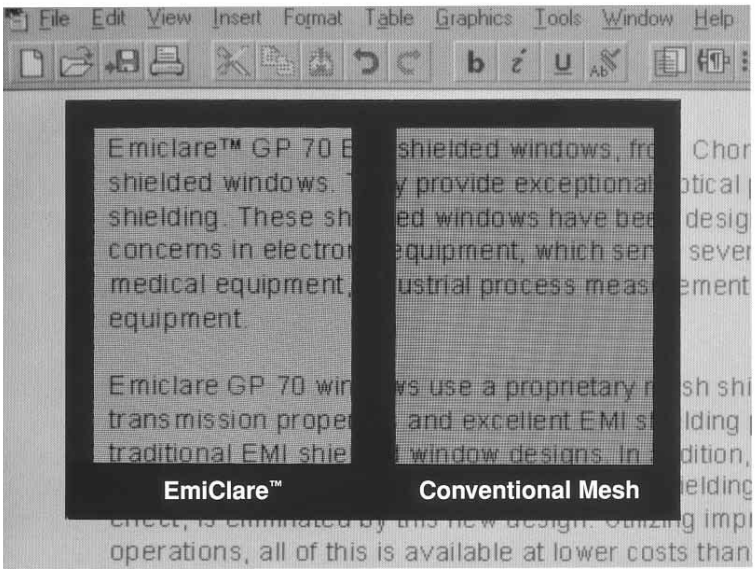
EmiClare™ GP 70 EMI Shielded Windows

EmiClare GP 70 EMI Shielded Windows

EmiClare GP 70 EMI shielded windows provide exceptional optical performance without sacrificing EMI shielding. This new generation of shielded windows is designed specifically to address shielding concerns in electronic equipment, especially medical devices, industrial process, measurement and control equipment, and test equipment.

EmiClare GP 70 windows use a proprietary mesh shielding design that provides superior light transmission and EMI shielding properties when compared to traditional shielded window designs. Total shielded window light transmittance properties (Figure 4), result from the mesh, substrates and surface finishes used. This new design also minimizes the typical problem with text distortion on display screens caused by the shielding mesh orientation, i.e., the moiré effect. Through improved, efficient manufacturing operations, these features are available at prices typically below conventional shielded windows.

EmiClare GP 70 EMI shielded windows are manufactured as a fully laminated construction with optically matched adhesives and front and rear UL 94V-0 rated, optical grade, polycarbonate substrates. Standard finish for the front surface is a non-glare hardcoat. A clear hardcoat finish is standard on the rear surface. An optional clear hardcoat is available on the front surface.The shielding media is provided by the GP 70 proprietary mesh design.



EmiClare windows are available in standard 2.0 mm (0.08 in.) thickness, and as an option in 1.66 mm (0.06 in.) and 3.0 mm (0.12 in.) thicknesses. Window termination can be either square or stepped, with a silver epoxy busbar. EmiClare windows are also available with Chomerics' SOFT-SHIELD® 5000 EMI gasket termination. SOFT-SHIELD 5000 gaskets feature a conductive cloth over urethane foam core. (See page 93.)

Figure 1 – Termination for EmiClare GP 70 Windows

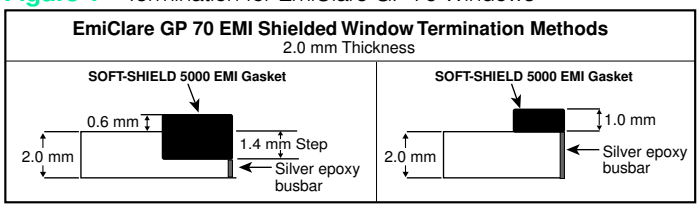


Table 1

EMICLARE GP 70 WINDOW SPECIFICATIONS	
Front Surface	Non-glare hard coating with a gloss level of 45. Clear hard coat is optional
Rear Surface	Clear hard coat is standard
Substrate	High optical grade polycarbonate, UL 94V-0 rated
EMI Shielding Effectiveness	See Figure 2
Scratch and Chemical Resistance	High scratch resistance to Pencil Test Type 2H. Chemical resistance to DIN standard 42115
Light Transmission	65-70% for the final assembly (Figure 4)
Quality	EmiClare windows are manufactured and inspected to Optical Inspection Standard OIS.3
Standard Thickness	2.0 mm (0.08 in.) with +/- 0.3 mm (0.01 in.) tolerance is standard. Other thicknesses are available on request
Maximum Window Size	Maximum window size is 533 mm x 533 mm (21 in. x 21 in.)
Termination	Square or step finishes with silver epoxy busbar and Chomerics SOFT-SHIELD® 5000 low closure force EMI gasket (Figure 1)
Part Numbering	Chomerics Part Numbers follow the format E-01-XXXXX and will be assigned by Chomerics

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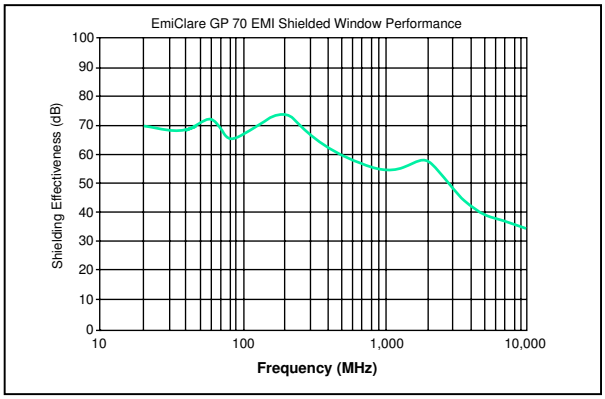
Figure 2 Shielding Effectiveness for EmiClare GP 70 Windows
(Measured via a modified MIL-STD-285 test procedure, CHO-TM-TPO8, using a 14 in. x 14 in. open aperture)



LIGHT TRANSMITTANCE

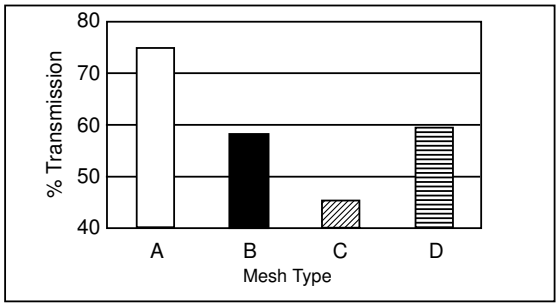
The light transmittance for a shielded window is a composite result of the effect of the shielding media, which includes the mesh, the front and rear substrates, and the surface finish on the substrates. The following figures and tables demonstrate how visual transmission is determined from the finished window assembly.

Mesh Light Transmittance

Figure 3 shows the percentage of light transmission for several different types of mesh used in typical EMI shielded windows.

A = EmiClare GP 70 mesh
B = blackened copper 100 opi/0.0022 in. (0.06 mm) wire diameter
C = plain copper 100 opi/0.0022 in. (0.06 mm) wire diameter
D = blackened/plated stainless steel 80 opi/0.0012 in. (0.03 mm) wire diameter

Figure 3 Mesh Light Transmittance



Substrate and Surface Treatment Light Transmittance

Table 2 shows the light transmittance of common shielded window substrates. Table 3 shows the light transmittance reduction for various surface finishes used on substrates for EMI shielding windows.

Table 2

SUBSTRATE LIGHT TRANSMITTANCE	
Substrate	**Light Transmittance**
Plain "float" glass	90-92%
Clear polycarbonate*	85-90%
Clear acrylic*	85-90%
Clear polyester*	83-88%

*varies with thickness due to internal dispersion

Table 3

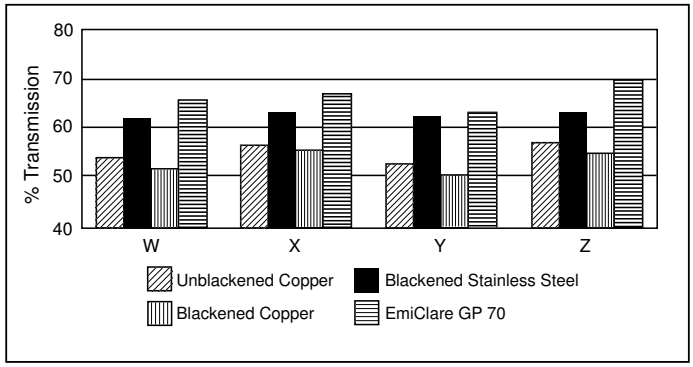
SURFACE FINISH LIGHT TRANSMITTANCE REDUCTION	
Surface Finish	**Light Transmittance Reduction**
Non-glare coatings (60-70 gloss)	2-3%
Non-glare coatings (80-90 gloss)	1%
Clear hard coat	<1%
MLAR* coating on glass	<1%

*multi-layer, anti-reflecting

Total Shielded Window Light Transmittance

Figure 4 details the actual light transmission of several types of EMI shielded windows, avoiding the common error of quoting the open mesh light transmission performance as that of the finished window.

Figure 4 Shielded Window Light Transmittance



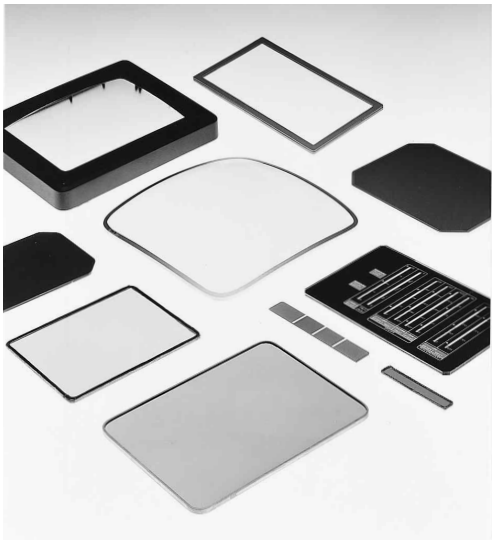
W = EMI shielded window 0.64 mm (0.025 in.) thick with polycarbonate substrates, with non-glare coating on the front surface and clear hard coat on the rear surface

X = EMI shielded window 1.2 mm (0.047 in.) thick with glass substrates, plain finish to both front and rear surfaces.

Y = EMI shielded window 1.5 mm (0.059 in.) thick with polycarbonate substrates, with non-glare coating on the front surface and plain polycarbonate on the rear surface.

Z = EMI shielded window 1.2 mm (0.047 in.) thick with glass substrates, MLAR (multi-layer anti-reflecting) coating on the front surface and plain glass on the rear surface.

WIN-SHIELD™ Optical Products



WIN-SHIELD Optical Products—Shielded Windows and Contrast Enhancement Filters

Chomerics produces a wide selection of performance-tested glass and plastic windows for visual displays requiring EMI radiation or susceptibility shielding.

These windows have been designed into commercial and military equipment to provide highly effective electromagnetic shielding while providing exceptional optical clarity and image resolution.

Chomerics' prototype-to-production capability includes an extensive line of spectrally-matched filters to meet stringent contrast enhancement performance requirements for both flat and curved configurations. By offering the best combination of EMI shielding and contrast enhancement, we've become a major supplier to manufacturers who must meet FCC and EU (European Union) requirements on digital devices.

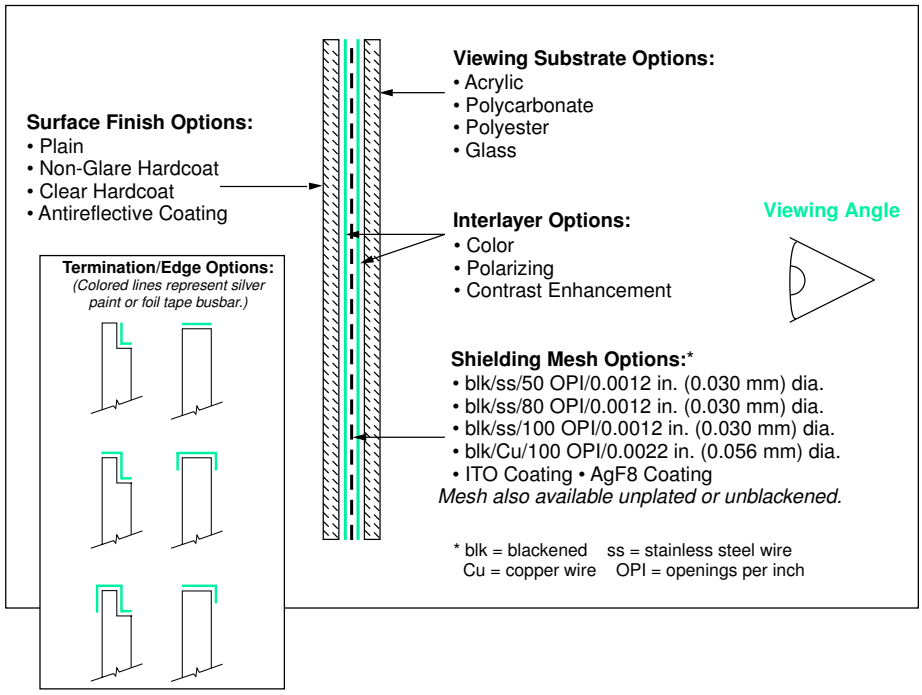
Windows can be produced in glass, plastic, or combinations of both. EMI shielding is provided by knitted or woven wire mesh, laminated between the glass or plastic substrates, or by deposited conductive coatings. Standard construction is shown in Figure 1. Shielding effectiveness is determined by the size of the wire screen openings, electrical contact between intersecting wires and the materials, and techniques employed to terminate the wire at the frame edge. Refer to Figures 2 and 3.

Our high performance EmiClare™ Shielded Windows utilize a proprietary mesh design in a fully laminated polycarbonate assembly that affords exceptional optical clarity without compromising EMI shielding performance. Refer to page 170 for more information on EmiClare Shielded Windows.

Our Applications Engineering staff and EMI Testing facilities provide the expertise necessary to design shielded window assemblies to meet specific requirements, and to verify performance. Our conductive adhesives, paints, tapes, gaskets and frames enable us to provide complete assemblies ready-to-mount.

Table 1

STANDARD COMPONENTS FOR WIN-SHIELD™ OPTICAL PRODUCTS	
Substrate materials	acrylic, polycarbonate, polyester, glass
Shielding materials	woven wire mesh, electrically conductive transparent coatings –Indium Tin Oxide, Silver Oxide
Shielding termination	conductive busbar, foil tape, extended mesh, conductive adhesive, conductive gasket
Anti-glare control	non-glare dispersive surface etch or coating on plastic and glass, multilayer anti-reflection coating on glass
Contrast enhancement	laminated broadband, high contrast narrow band, or sunlight readable spectrally matched filters, circular polarizers
Size limit and thickness range	Stainless Steel Mesh 24 x 24 in. (61 x 61 cm) 31-185 mils (0.8-4.7 mm) Copper Mesh 24 x 36 in. (61 x 91 cm) 31-185 mils (0.8-4.7 mm) AgF8 Film or Indium Tin Oxide 48 x 48 in. (122 x 122 cm) 7-8 mils (0.175-0.200 mm)



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WIN-SHIELD Windows EMI Shielding Performance

Figure 2

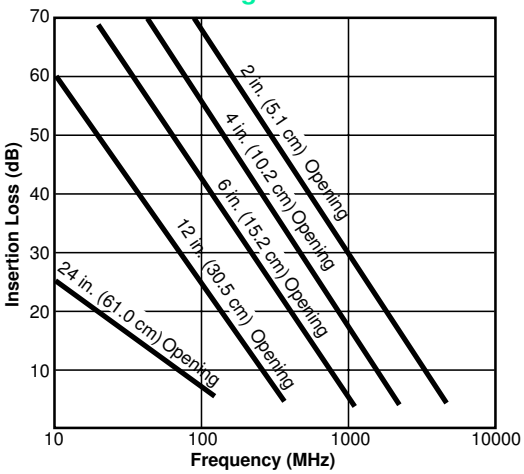


Figure 3

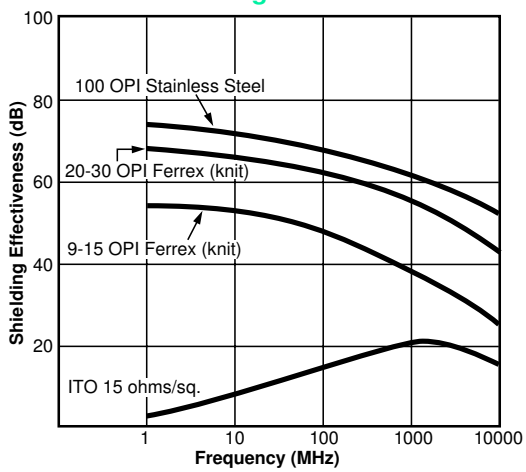


Figure 2 illustrates amount of insertion loss typically achieved through open apertures ranging from 24 in. to 2 in. (61 cm to 5.1 cm) square (per MIL-STD-285). Typical insertion losses of various window materials (properly terminated) are shown in **Figure 3.** To determine total shielding effectiveness attained for any size opening with any window material, add the appropriate curves in Figures 2 and 3 together.

Contrast Enhancement Filters

Figure 4 Antireflection Coating

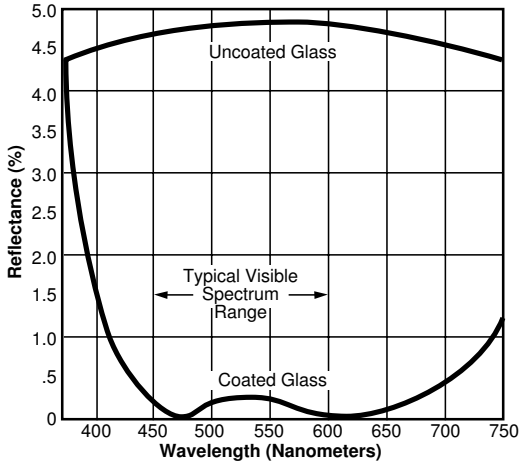


Figure 4 demonstrates the amount of glare reduction achieved with ≤0.35% MIL-C-14806A anti-reflection coating compared to uncoated glass.

Figure 5 Color Matching

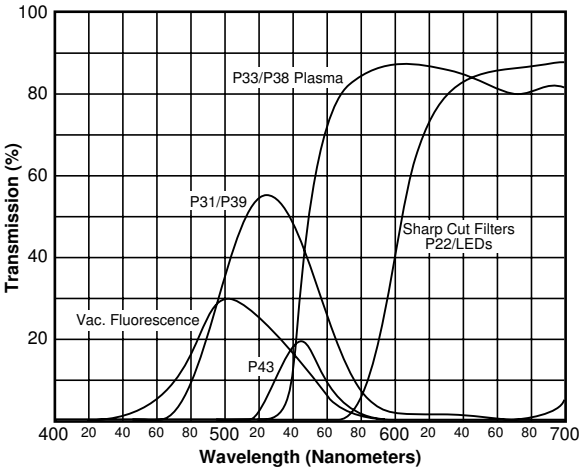


Figure 5 illustrates the light output of Chomerics' color filters. These filters are designed to match the peak wavelength of a display while selectively absorbing white light to achieve the greatest amount of display contrast.

WIN-SHIELD™ AgF8 Conductive Film

WIN-SHIELD AgF8 Conductive Film

Chomerics' AgF8 conductive film is a multi-layer, silver oxide-based thin film coating applied to a heat stabilized, optical quality polyester film. AgF8 film provides high visible light transmission and significant infrared reflectance.

The silver coating also provides high electrical conductivity, making AgF8 film a good EMI shielding material from 1 MHz to 1 GHz, suitable for use in most display applications. The attenuation profile, ignoring aperture effects, is shown in Table 2.

AgF8 conductive film is an ideal EMI shielding medium for applications where optical quality cannot be specified. Examples include high resolution CRT displays, multi-color displays, LCDs and EL displays. AgF8 conductive film will reflect heat for temperature-sensitive LCD applications.

Ordering Procedure

AgF8 coating is available as an unsupported film, in lengths up to 500 ft. (150 m). Nominal thickness is 0.008 inch (0.2 mm) and maximum width is 48 inches (122 cm). It can also be laminated to acrylic, polycarbonate or glass, and combined with circular polarizers and dichroic (color) filters.

Contact our Applications Engineering Department to review your requirements.

Table 1

WAVELENGTH (NM)	LIGHT TRANSMISSION (%)	REFLECTION (%)
400	60	10
500	82	6
550	82	5
600	80	6
650	76	10
1200	35	55
1500	20	74

Table 2

FREQUENCY	ATTENUATION (dB)
1 MHz (E-Field)	100
10 MHz (E-Field)	60
100 MHz (E-Field)	54
1 GHz (Plane Wave)	24
10 GHz (Plane Wave)	19

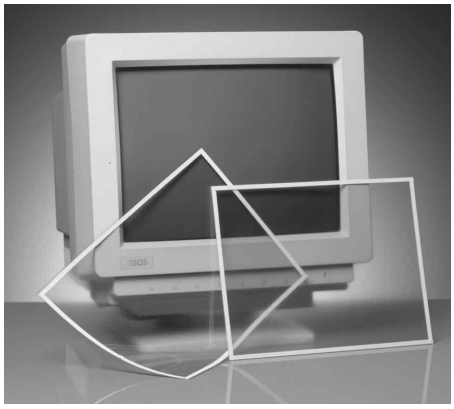
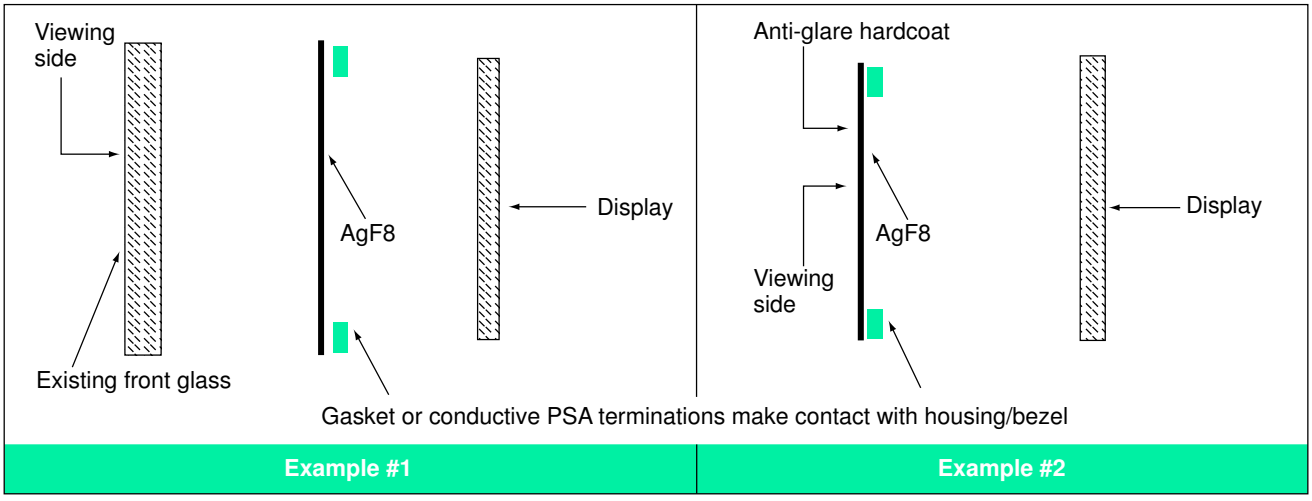


Table 3

TYPICAL PROPERTIES	
Surface Resistance, ohms/sq.	8-12
Visible Light Transmission, %	80
Thickness, inch (mm)	0.007-0.008 (0.175-0.200)
Environmental Stability Humidity: 140°F (60°C), 95% RH Dry Heat: 212°F (100°C) Saturated NaCl	120 hrs. with no change in resistance

Typical Applications



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