



GE Structured Products

Flame-Retardant Film

**For Electronic Insulation
and Shielding**

FR Film

Trust Films from GE Structured Products

for ease of processing, versatility and
outstanding part performance

LEXAN[®], VALOX[®] and ULTEM[®] films from GE Structured Products provide cost-effective solutions in applications ranging from simple, flat barrier insulation to highly complex, three-dimensional EMI/RFI shielding.

● Excellent electrical and mechanical properties

Films, in conjunction with our fabrication partners, provide a low cost, lightweight solution to both primary and secondary shielding problems.

Flame retardant insulating film laminated to a conductive foil, such as copper or aluminium, allows creatively designed shields to be placed in close proximity to the emitting source, without fear of internal arcing. Typical applications are ground planes, gaskets, box designs, trays or spacers.

● UL Listings

The range offers a strong complement of flame retardant, electrical and thermal properties. For a complete list of the most recent UL Listings contact GE Structured Products. GE films are listed under UL File #E61257 (R).

● Easy, cost-effective fabrication

All grades are easily die-cut with steel rule dies or tools and can be match metal thermoformed or cold embossed. Gauge control across the web is excellent, ensuring uniform cutting or creasing and preventing the risk of damage to the die from uneven film thickness.

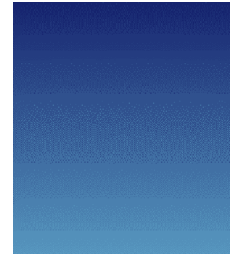
All films can be cut cleanly without burring or edge cracking and when bent or folded, they remain in position. They are also compatible with a broad range of fastening and laminating adhesives, including silicone rubbers, epoxies and acrylics.

● Excellent printability

Unlike some other insulating materials, films from GE Structured Products are easily printed with part I.D. numbers or standard safety warnings (usually before die-cutting), often eliminating the need for secondary labelling required with other materials.



VALOX® FR Film



For a display screen shield, VALOX FR1 film provides high performance in a thin gauge. VALOX is laminated to aluminium foil resulting in a 'seamless box'.

VALOX

VALOX FR1 film is a flame retardant polybutylene terephthalate material offering good temperature resistance and chemical resistance, in addition to excellent dielectric strength. This makes it suitable for a wide range of applications in the electronics industry, such as disc drive insulation, and other business machine barrier insulation applications. Low moisture absorption and high chemical resistance make it suitable for laminated EMI/RFI shields.

0.010" VALOX FR1 film provides a flame retardant barrier insulation in this motor application. The film's combination of chemical resistance, dielectric strength and thermoformability make it ideal to produce a custom shape.

UL Listings

| Product | Thickness inches/mm | UL94 Flame Class Rating | UL1950 Qualified | Tensile Heat Distortion Temp°C | Thermal Index Electrical°C | UL PERFORMANCE LEVEL CATEGORIES | | | Moisture Absorption (%) | Shrinkage (%) |
|----------------|------------------------|-------------------------------|---------------------|--------------------------------------|----------------------------------|------------------------------------|-----|-----|-------------------------------|------------------|
| | | | | | | HWI | HAI | CTI | | |
| VALOX FR1 Film | .003-.004 / .08-.10 | VTM-2 | - | 167 | - | - | - | 2 | 0.40 | <1.0@150°C |
| VALOX FR1 Film | .005-.009 / .127-.23 | VTM-0 | ✓ | 167 | 125 | - | - | 2 | 0.40 | <1.0@150°C |
| VALOX FR1 Film | .010-.024 / .25-.60 | VTM-0 | ✓ | 167 | 125 | 4 | 0 | 2 | 0.40 | <1.0@150°C |
| VALOX FR1 Film | .025 / .63 | V-0 | - | 167 | 120 | 3 | 0 | 2 | 0.40 | - |

ULTEM® FR Film

ULTEM

ULTEM film is the substrate for this high-performance screen-printed circuit board. With 10 circuit surfaces, the board replaces 15 parts, achieving a 30% cost saving over conventional technology.

ULTEM film is manufactured from ULTEM polyetherimide resins. It is GE's highest performance film, offering enhanced heat and chemical resistance. Low moisture absorption and excellent dielectric properties make ULTEM film the superior choice for a broad range of applications including high-voltage internal insulation, high-temperature PSA tapes and speaker cones.

ULTEM film was specified for shielding these PCBs used in personal TV systems for passenger aircraft. It was chosen for its excellent electrical properties, flame retardance and proven performance in avionics applications.

UL Listings

| Product | Thickness inches/mm | UL94 Flame Class Rating | Tensile Heat Distortion Temp°C | Thermal Index Electrical°C | UL PERFORMANCE LEVEL CATEGORIES | | | Moisture Absorption (%) | Shrinkage (%) |
|-----------------|------------------------|-------------------------------|--------------------------------------|----------------------------------|------------------------------------|-----|------|-------------------------------|------------------|
| | | | | | HWI | HAI | CTI | | |
| ULTEM 1000 Film | .002-.007 / 0.50-.175 | VTM-0 | 210 | - | - | - | 0.25 | 0.135@200°C | |

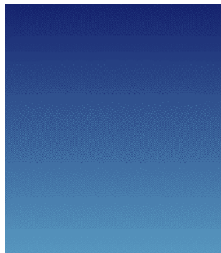
LEXAN® FR Film

Clear or opaque LEXAN FR film is a flame retardant polycarbonate material available with a variety of surface textures and offering an excellent complement of properties. It is highly puncture resistant and maintains its performance at extremes of temperature.

LEXAN FR film's, excellent dielectric strength and UL94 V-0 rating make it an ideal choice for barrier insulation applications. These include insulation for high voltage power supplies, printed circuit boards and monitors. It also acts as a good carrier for foil based EMI/RFI shields.



LEXAN FR700 film was selected for use as the insulation in this power supply application due to its total dielectric strength of 17,000 volts at 0.010", a UL94 V-0 rating and lowcost.



LEXAN FR700 film and copper foil provide a high-end solution to an extremely demanding digital shielding problem. Precise control of shield location was critical, making a die-cut part the winner over conductive paint.

LEXAN

UL Listings

| Product | Thickness inches/mm | UL94 Flame Class Rating | UL1950 Qualified | Tensile Heat Distortion Temp°C | Thermal Index Electrical°C | UL PERFORMANCE LEVEL CATEGORIES | | | Moisture Absorption (%) | Shrinkage (%) |
|------------------|------------------------|-------------------------------|---------------------|--------------------------------------|----------------------------------|------------------------------------|-----|-----|-------------------------------|------------------|
| | | | | | | HWI | HAI | CTI | | |
| LEXAN FR700 Film | .010 / .25 | V-0 | ✓ | 150 | 130 | 1 | 0 | 3 | 0.28 | 0.3@135°C |
| LEXAN FR700 Film | .015 / .38 | V-0 | ✓ | 150 | 130 | 0 | 0 | 3 | 0.28 | 0.3@135°C |
| LEXAN FR60 Film | .010 / .25 | V-0 | ✓ | 150 | 130 | 0 | 0 | 3 | 0.28 | 0.3@135°C |
| LEXAN FR60 Film | .015 / .38 | V-0 | ✓ | 150 | 130 | 0 | 0 | 3 | 0.28 | 0.3@135°C |
| LEXAN FR83 Film | .002 / .05 | VTM-0 | - | - | 80 | - | - | 3 | - | - |

Film Technology Backed by Hands-On Support

The growing family of GE thin-gauge extruded film products represents diverse technologies from the industry's broadest and most comprehensive engineering plastics line. The superior properties, durability and performance of these materials are your assurance of quality results.

To optimize your use of GE film products, GE Structured Products offers a range of technical assistance throughout every phase of your project – from initial concept through design, fabrication and end-use.

For further information, please call: (800) 451-3147 or (413) 448-5400.

For Customer Service assistance, please call: (800) 323-3783

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