



SUNSHADE THERMAL CONTROL FILM

Technical Data Sheet



PROCESS/PRODUCT DESCRIPTION

DSI has more than twenty years of production history for Sunshade, a thermal control material consisting of a multi-layer dielectric thin-film stack deposited onto Kapton™ film. Our customers have a similar record of successful use in LEO, MEO, and GEO applications.

DSI Sunshade was originally developed in collaboration with satellite engineers looking for improved thermal control using RF-transmissive materials with added ESD properties. Sunshade's continuous coating is distinct from patterned grid films in that no metallic materials are used in its construction.

Sunshade supports modern high-data-rate communications systems in L, S, C, X, Ku, K, Ka, and V bands.

APPLICATION

Satellite radomes, antenna covers, and apertures for thermal control and ESD control

BENEFITS

- Reduces solar heat gain of satellite communications equipment
- Broad-spectrum RF transmittance with low insertion loss
- Manufactured using space-qualified materials
- Tuned for Air Mass Zero (AM0) solar irradiation
- Resistant to oxidation in Atomic Oxygen (AO) rich environments

FEATURES

- Lightweight – area factor of ~45 ft²/lb, equivalent to 3 mil Kapton
- Flexible and conformable film can be cut, perforated, folded, and stitched
- Panel sizes up to 30" x 120" are available
- A proprietary combination of low insertion loss materials provides low RF attenuation
- Space-qualified and flight-proven
- Performance is resistant to degradation due to temperature cycling
- Both surfaces accept typical space-qualified adhesive and tape systems

RF PROPERTIES

- Low RF attenuation from below 1 GHz through 69 GHz
- Suitable for use in L, S, C, X, Ku, K, Ka, and V bands

FUNCTIONAL PROPERTIES

- Solar Reflectance $\geq 82\%$
- Solar Transmittance $\leq 2\%$
- External surface provides ESD with sheet resistance of 2.5E5 to 1.0E9 Ohm/square
- Hemispherical emissivity ≥ 0.72 at 300K
- RF insertion loss ≤ 0.8 dB from 1 GHz – 69 GHz

SURVIVABILITY

- Tested under environmental conditions including particulate radiation, atomic oxygen, solar UV/VIS/NIR and thermal cycling to simulate service in LEO, Polar, and GEO environments
- Retains properties through testing to simulate end-of-life at:
 - 15 years for GEO particle irradiation + insolation
 - 8 years for LEO atomic oxygen
 - 1000 equivalent-hours for solar UV+VIS
- All component materials have long service histories as well as validation in space simulation

CUSTOMIZATION

DSI's standard Sunshade is tuned for AM0. Spectral properties can be customized in the VIS, NIR and MWIR ranges. DSI closely collaborates with customers to meet special and proprietary requirements.