

# Optical Solar Reflectors

Designed and manufactured for thermal control

## Qioptiq

- Design and manufacture of radiation-stable Optical Solar Reflectors (OSR's)
- Over 35 years of Space Heritage
- Space Qualified
- Choice of glass types (CMX, CMO)
- Worlds leading supplier
- Bespoke solutions

### Typical Optical Solar Reflector Specifications with 0.10mm thick CMX and CMO glass types

	Specification	Maximum Alpha	Emittance	Front Surface Sheet Resistance	Front to Back Conductivity
Standard OSR (CMX)	PS 343	0.100	0.86	N/A	N/A
Conductive Coated OSR (CMX)	PS 344	0.100	0.83	<5 K Ohms/Square	<200k Ohms
UVS Coated OSR (CMX)*	PS 347	0.060	0.83	N/A	N/A
UVS/CC/OSR (CMX)	PS 349	0.060	0.83	<5 K Ohms/Square	<200k Ohms
Conductive Coated OSR CMO Glass	PS 613	0.085	0.83	<5 K Ohms/Square	<200k Ohms
Plain OSR (CMO)	PS 614	0.085	0.87	N/A	N/A

Alpha - Solar absorptance measurements calculated between 250 and 2500nm

Emittance - Normal emittance calculated between 5 and 50 microns

\*UV Reflective coating designed to operate from 0 – 66° angle of incidence

### Mechanical Properties

<b>Thickness:</b>	0.050mm to 0.50mm / 0.002" to 0.02" Special thicknesses on request
<b>Tolerancing:</b>	LxW $\pm 0.05\text{mm} / 0.002''$
<b>Surface Finish:</b>	As drawn to: MIL-PRF-13830B, 80/50 scratch dig
<b>Parallelism:</b>	0.05mm per 20mm
<b>Perpendicularity:</b>	$90^\circ \pm 0^\circ 30'$
<b>Coating:</b>	Uncoated area, masked by coating tooling, shall not exceed 1% of the total coverglass area
<b>Edge Quality:</b>	Chemically etched for strength enhancement
<b>Humidity Resistance:</b>	98% $\pm 2\%$ relative humidity for 72 hours @ $50^\circ\text{C} \pm 20^\circ\text{C}$
<b>Adhesion:</b>	Using cellulose tape to MIL-M-13508
<b>Abrasion:</b>	20 strokes with 6mm pencil type eraser to MIL-E-12397 loaded to 10N
<b>Radiation Resistance:</b>	UV exposure, electron, low energy proton, high energy proton - please refer to relevant specifications
<b>Thermal Cycling:</b>	Details on request

### Physical Properties

	CMX	CMO
<b>Density:</b>	$2.60 \pm 0.02\text{g cm}^3$	$2.54 \pm 0.02\text{g cm}^3$
<b>Thermal Expansion Coefficient:</b>		
Average over range $-100^\circ\text{C}$ to $100^\circ\text{C}$	$6.0 \pm 0.75 \times 10^{-6}/^\circ\text{C}$	$5.5 \pm 0.75 \times 10^{-6}/^\circ\text{C}$
Average over range $-100^\circ\text{C}$ to $200^\circ\text{C}$	$6.5 \pm 0.75 \times 10^{-6}/^\circ\text{C}$	$6.0 \pm 0.75 \times 10^{-6}/^\circ\text{C}$
Average over range $+30^\circ\text{C}$ to $200^\circ\text{C}$	$7.0 \pm 0.75 \times 10^{-6}/^\circ\text{C}$	$6.5 \pm 0.75 \times 10^{-6}/^\circ\text{C}$
<b>Youngs Modulus:</b>	$75.0 \pm 2\text{ GNm}^{-2}$	$70 \pm 2\text{ GNm}^{-2}$
<b>Poissons Ratio:</b>	$0.21 \pm 0.05$	$0.22 \pm 0.05$
<b>Bulk Resistivity:</b>		
At $20^\circ\text{C}$	$11.5 \pm 1\text{ log ohm meter}$	$16.0 \pm 1\text{ log ohm meter}$
At $60^\circ\text{C}$	$10.0 \pm 1\text{ log ohm meter}$	$14.0 \pm 1\text{ log ohm meter}$
<b>Refractive Index:</b>	1.524 – 1.530	1.510 – 1.516

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