



A JDS Uniphase Company

Optical Coating Laboratory Inc.  
2789 Northpoint Parkway, Santa Rosa, CA 95407

## Product Specification

Template # 02272001-Z70L-FOL9 Version 2.0

### EMI/RFI SHIELDING LOW OHM ITO COATING

6035020

#### 1.0 Description:

This specification defines a family of EMI/RFI shielding ITO transparent conductive coatings applied to glass display products.

#### 2.0 Reference Documents

EMI/RFI Shielding Low Ohm ITO Coating / Document #6035020 Rev. D

The following documents form a part of this specification to the extent referenced herein:

MIL-C-675 C            Coating of Glass Optical Elements (Anti reflection)

MIL-M-13508 C        Mirror Coating Process, Front Surface Aluminized for Optical Elements

OCLI Specification  
8510002                "Scotch" Tape Adhesion Test

#### 3.0 Performance/Operating Characteristics Required

##### EQUIPMENT, MATERIALS, AND SUPPLIES

Rapid Scanner or equivalent, and a Delcom Conductance Monitor or equivalent.

##### PRODUCT DESCRIPTION

A family of seven low resistance ITO coating is offered which has the following sheet resistance values. As described in Table I, the product types are labeled A, B, C, D, E, F, and G. The specified sheet resistance values for these designs are also listed.



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TABLE I

SHEET RESISTANCE (OHMS / SQUARE)

<u>TYPE</u>	<u>SPECIFIED</u>	<u>TYPICAL</u>
A	$\leq 0.25$	0.20
B	$\leq 0.5$	0.44
C	$\leq 1.0$	0.87
D	$\leq 2.0$	1.7
E	$\leq 4.0$	3.4
F	$\leq 5.0$	4.5
G	$\leq 10.0$	6.0



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## SPECTRAL PERFORMANCE

Measured values of transmittance and reflectance of the ITO are a function of the index of refraction of the incident medium in which the ITO is optically coupled. Table II gives spectral performance values of the coatings in air while Table III gives values for coatings submersed in a medium having a 1.52 index of refraction. Transmittance values are average over the visible range of 400-700nm at 0° angle of incidence. Specified transmittance values are the minimum permissible. Typical values for transmittance and reflectance are also given.

**TABLE II**

### COATING ONLY PERFORMANCE IN AIR

TYPE	SHEET	AVERAGE	AVERAGE	AVERAGE
	RESISTANCE	% TRANS.	% TRANS.	% REFLEC.
	<u>SPECIFIED</u>	<u>SPECIFIED</u>	<u>TYPICAL</u>	<u>TYPICAL</u>
A	≤ 0.25	> 29	40	10
B	≤ 0.5	> 53	62	10
C	≤ 1.0	> 64	71	10
D	≤ 2.0	> 75	80	10
E	≤ 4.0	> 80	83	11
F	≤ 5.0	> 82	85	11
G	≤ 10.0	> 83	86	11



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**TABLE III**

**COATING ONLY PERFORMANCE IN 1.52 MEDIUM**

	SHEET	AVERAGE	AVERAGE	AVERAGE
	RESISTANCE	% TRANS.	% TRANS.	% REFLEC.
<u>TYPE</u>	<u>SPECIFIED</u>	<u>SPECIFIED</u>	<u>TYPICAL</u>	<u>TYPICAL</u>
A	≤ 0.25	> 33	45	2
B	≤ 0.5	> 58	70	2
C	≤ 1.0	> 69	80	2
D	≤ 2.0	> 81	90	2
E	≤ 4.0	> 86	92	2.5
F	≤ 5.0	> 88	92	2.5
G	≤ 10.0	> 89	93	2.5

## INDEX MATCHED PRODUCT OPTION

Low ohm ITO coatings can be modified to give higher transmission and reduce reflection by “index matching” the ITO to the medium. This is accomplished by incorporating additional thin film layers with the ITO.

When indexed matched to air, low ohm ITO coatings will typically reflect less than 2% while the transmittance will increase by approximately 8% over the values in Table II. When index matched to a 1.52 medium, the reflectance values of low ohm coatings will be reduced to approximately 0.5% while transmittance will increase about 1-2% over the values in Table III. Matching to materials having other indices of refraction is available with comparable performance improvement.



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### 4.0 Quality Assurance Provisions

#### ENVIRONMENTAL DURABILITY

##### Adhesion

The coating shall show no evidence of damage when an approved tape (refer to OCLI Spec. 8510002) is pressed firmly against the coated surface and slowly removed (reference MIL-M-13508 C, Para. 4.4.6)

##### Abrasion Resistance

The coating shall show no evidence of deterioration after being subjected to a 40 rub (stroke) eraser abrasion resistance test using a rub force of 2-2 ½ lbs., after humidity test (reference MIL-C-675 C, Para. 4.5.10)

##### Humidity

The coating shall be subjected to continuous exposure for 24 hours in an atmosphere of 120°F ± 4°F with 95-100% relative humidity without evidence of deterioration (reference MIL-C-675C, Para. 4.5.8)

### 5.0 Preparation for Delivery

N/A

### 6.0 Definitions

N/A

### 7.0 Notes

N/A

### 8.0 Safety Information

N/A