

**DATA SHEET**
**ITO GLASS WINDOWS & PLATES**
**MATERIAL DATA**

GLASS COMPOSITION (TYPICAL, % BY WEIGHT)	SODA LIME
Al <sub>2</sub> O <sub>3</sub>	1.0 -1.9
CaO	7.-12
FE <sub>2</sub> O <sub>3</sub>	0.08 - 0.14
MgO	1.0 - 4.5
Na <sub>2</sub> O + K <sub>2</sub> O	13 -15
SO <sub>4</sub>	0 - 0.3
SiO <sub>2</sub>	70-73

**CHEMICAL RESISTANCE (TYPICAL)**

	SODA LIME
Alkali attack DINISO695/DIN52322	1
Acid resistance DIN12116	3
Hydrolytic resistance ISO709/DIN12111	3

**PHYSICAL PROPERTIES (TYPICAL)**

		SODA LIME
Density	10 <sup>3</sup> kg/m <sup>3</sup>	2.498
Young's Modulus	10 <sup>3</sup> kg/mm <sup>2</sup>	7.5
Poisson Ratio		0.22
Vickers Hardness	10 <sup>3</sup> kg/mm <sup>2</sup>	0.63
Shear Modulus	10 <sup>3</sup> kg/mm <sup>2</sup>	
Thermal Expansion	10 <sup>-6</sup> /K	8.5 – 9.0
	at °C	20 – 350
Specific Heat	Cal/g°C	0.18
	at °C	0 – 50
Thermal Conduct	Kcal/m h °C	0.65
Strain Point	°C	523
Softening Point	°C	525 - 555
Annealing Point	°C	720 – 740
Transmittance	%	≥ 90
Refractive Index		1.517

**ELECTRICAL PROPERTIES (TYPICAL)**

	SODA LIME
Volume resistivity / log Ω cm	
At 20 °C	13.5
At 50 °C	12
At 100 °C	10
At 200 °C	7.3
At 300 °C	5.6
Dielectric constant	7.6 (at 1 kHz)
Dielectric loss (tan Ø)	0.02 (at 1 kHz)

**BARRIER COATING - SiO<sub>2</sub>**

Properties	
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## DATA SHEET

## ITO GLASS WINDOWS & PLATES

Thickness (specified)	nm $\geq 20\lambda$
Thickness (typical)	nm 23
Barrier efficiency (Na ion diffusion)	$\mu\text{g}/\text{cm}^2 \leq 0.1$
Transmittance at $\lambda = 550\text{nm}$	% $\geq 89$
Refractive index at $\lambda = 632.8\text{nm}$ typical	1.5
Chemical resistance in HF	nm/min $\leq 20$ (linear part)
Chemical resistance in HF for VIS V	nm/min $\leq 25$ (linear part)
Adhesive tape test	ok
Rubber test	ok

### ETCHING

The coating will be removed completely when placed in an unagitated solution with the constituents and temperature as specified below. Sufficient deionized water rinsing after etching is essential.

<b>Fully oxidized ITO</b>	
HCl Etchant	
Hydrochloric acid con c. > 32%	Vol % 48.1
Nitric acid con c. 65 %	Vol % 3.8
Deionized water	Vol % 48.1
Temperature	$^{\circ}\text{C}$ $45 \pm 1$
Etch time	Sec/nm ITO thickness $\leq 3.5$
HBr Etchant	
Hydrobromic acid con c. 48%	Vol % 100
Temperature	$^{\circ}\text{C}$ $45 \pm 1$
Etch time	Sec/nm ITO thickness $\leq 1$
Partially oxidized ITO	
<b>HCl Etchant</b>	
Hydrochloric acid con c. > 32%	Vol % 14.5
Nitric acid con c. 65 %	Vol % 0.5
Deionized water	Vol % 85.0
Temperature	$^{\circ}\text{C}$ $25 \pm 2$
Etch time	Sec/nm ITO thickness $\leq 0.5$

Oxidation: Recommended oxidation of partially oxidized ITO in circulated air oven with ambient air  $390^{\circ}\text{C}$  / 30 min

### TRANSPARENT CONDUCTIVE COATING – FULLY OXIDIZED ITO

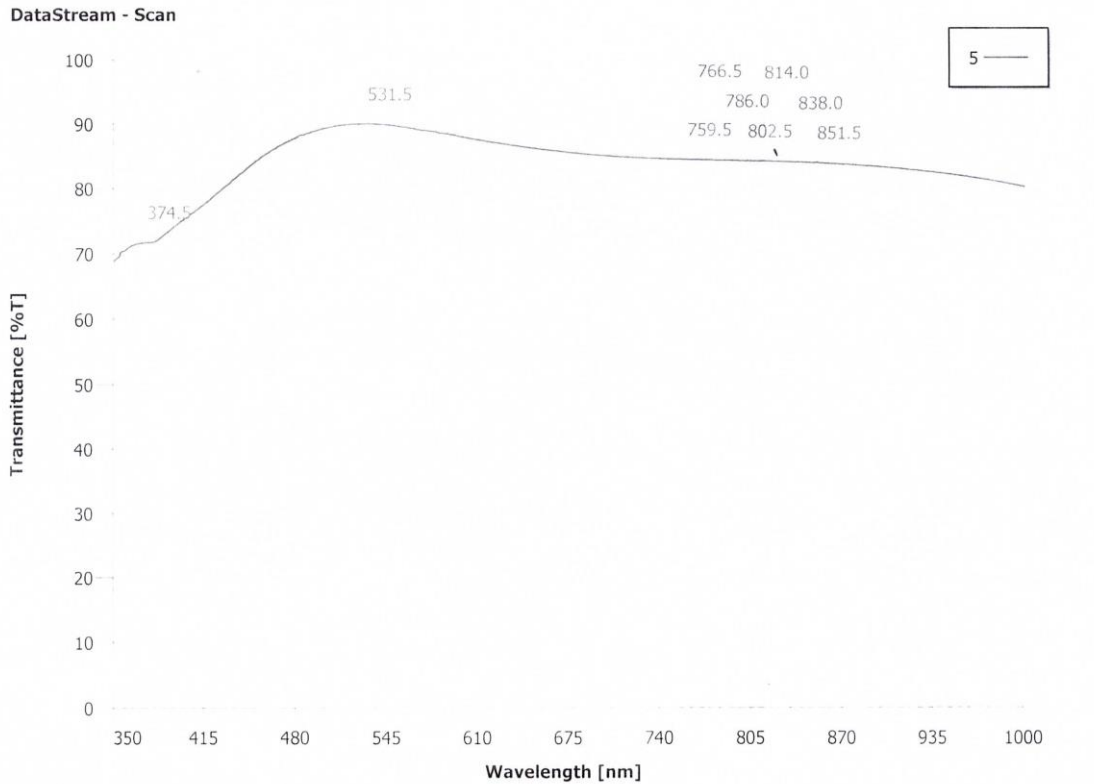
<b>COMMON PROPERTIES</b>	
Etchability in HCl	Nm/sec $\geq 0.3$ (linear part)
Etchability in HBr	Nm/sec $\geq 1.0$ (linear part)
Refractive index at $\lambda = 632.8\text{nm}$ typical	1.85
Chemical resistance in NaOH	
- change of sheet resistance	% $\leq 10$
- change of appearance	none
Temperature stability (change of sheet resistance) After cycle at $300^{\circ}\text{C}$ , 30 min.	% $\leq 250$
Humidity stability – change of sheet resistance	% $\leq 10$
Adhesive tape test	Ok
Rubber test	ok

**DATA SHEET**

**PRODUCT NAME**

**TRANSMISSION DATA**

**DataStream - CE3000 Series**



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          SCAN 5
          CECIL CE 2021
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Serial No: 923253
Time: 08:58 02/07/15
Speed: 10 nm/s
Averaging: 2.0 nm
Bandwidth: 4.0 nm
Operator:
Reference:
Sample:
  
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