ITO COATED GLASS

MATERIAL DATA

GLASS COMPOSITION (TYPICAL, % BY WEIGHT)	SODA LIME
Al_2O_3	1.0 -1.9
CaO	7.-12
FE_2O_3	0.08 - 0.14
MgO	1.0 - 4.5
$Na_2O + K_2O$	13 -15
SO_4	0 - 0.3
SiO_2	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	10^3 kg/m³	2.498
Young's Modulus	10^3 kg/mm²	7.5
Poisson Ratio		0.22
Vickers Hardness	10^3 kg/mm²	0.63
Shear Modulus	10^3 kg/mm²	
Thermal Expansion	10^{-6}/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_2

Properties	

Thickness (specified)	nm ≥ 20λ
Thickness (typical)	nm 23
Barrier efficiency (Na ion diffusion)	µg/cm² ≤ 0.1
Transmittance at λ = 550nm	% ≥ 89
Refractive index at λ = 632.8nm typical	1.5
Chemical resistance in HF	nm/min ≤ 20 (linear part)
Chemical resistance in HF for VIS V	nm/min ≤ 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.

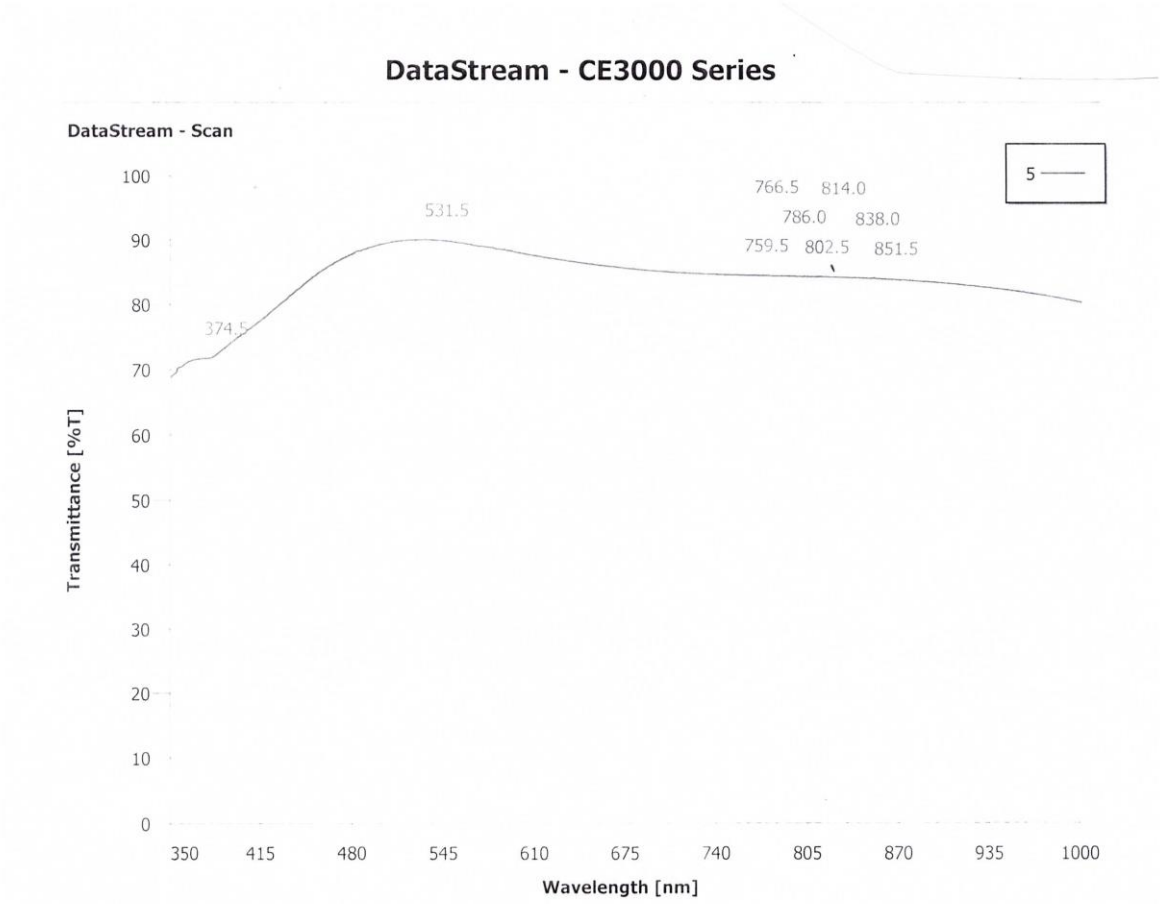
Fully oxidized ITO	
HGI Etchant	
Hydrochloric acid con c. > 32%	Vol % 48.1
Nitric acid con c. 65 %	Vol % 3.8
Deionized water	Vol % 48.1
Temperature	° C 45± 1
Etch time	Sec/nm ITO thickness ≤ 3.5
HBr Etchant	
Hydrobromic acid con c. 48%	Vol % 100
Temperature	° C 45± 1
Etch time	Sec/nm ITO thickness ≤ 1
Partially oxidized ITO	
HCl Etchant	
Hydrochloric acid con c. > 32%	Vol % 14.5
Nitric acid con c. 65 %	Vol % 0.5
Deionized water	Vol % 85.0
Temperature	° C 25± 2
Etch time	Sec/nm ITO thickness ≤ 0.5

Oxidation: Recommended oxidation of partially oxidized ITO in circulated air oven with ambient air 390°C / 30 min

TRANSPARENT CONDUCTIVE COATING – FULLY OXIDIZED ITO

COMMON PROPERTIES	
Etchability in HCl	Nm/sec ≥ 0.3 (linear part)
Etchability in HBr	Nm/sec ≥ 1.0 (linear part)
Refractive index at = 632.8nm typical	1.85
Chemical resistance in NaOH - change of sheet resistance - change of appearance	 % ≤ 10 none
Temperature stability (change of sheet resistance) After cycle at 300 °C, 30 min.	 % ≤ 250
Humidity stability – change of sheet resistance	% ≤ 10
Adhesive tape test	Ok
Rubber test	ok

TRANSMISSION DATA

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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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WHILE EVERY ATTEMPT HAS BEEN MADE TO VERIFY THE SOURCE OF THE INFORMATION, NO RESPONSIBILITY IS ACCEPTED FOR ACCURACY OF DATA.

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