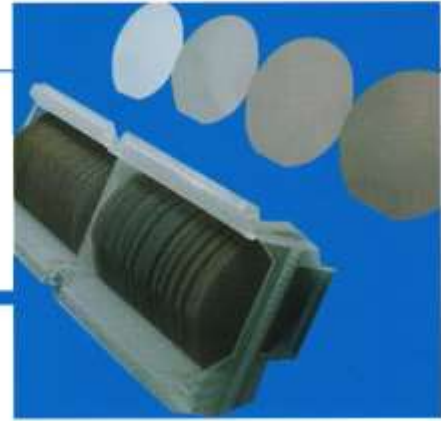


Black-LT Black-LN



Special Features

- ▶ High ability of electrical charges neutralization. Black-LT and Black-LN wafers shall neutralize the electrical charges instantaneously even if any electrical potential occur rapidly and slightly.
- ▶ Black-LT and Black-LN shall have no difference at piezoelectric properties from usual LT and LN wafers.
- ▶ High uniformity of Bulk resistivity throughout the surface and depth of wafers.
- ▶ Bulk resistivity shall be voluntarily controllable at each level ($1.0E+10 \sim 9.0E+11 \Omega \cdot \text{cm}$).

Specification of Bulk resistivity, Bulk conductivity

Black-LT

	Standard Black	Super Black
Bulk resistivity ($\Omega \cdot \text{cm}$)	$0.9E+11 \sim 9.9E+11$	$1.0E+11 \sim 9.9E+10$
Bulk conductivity ($\Omega^{-1} \cdot \text{cm}^{-1}$)	$1.11E-11 \sim 1.11E-12$	$1.0E-10 \sim 1.11E-11$

Black-LN

	Standard Black
Bulk resistivity ($\Omega \cdot \text{cm}$)	$1.0E+10 \sim 9.9E+10$
Bulk conductivity ($\Omega^{-1} \cdot \text{cm}^{-1}$)	$1.00E-10 \sim 1.00E-11$

Typical Specifications

Black-LT Wafers

Orientation	Diameter	Thickness	Surface Finish (+)plane (-)plane	
36° Y-cut 38.7° Y-cut 42° Y-cut 48° Y-cut X-112° Y-cut	150.0(mm) 100.0(mm)	0.25(mm) 0.35(mm) 0.50(mm)	Mirror Polished	GC#1000 GC#2000

Black-LN Wafers

Orientation	Diameter	Thickness	Surface Finish (+)plane (-)plane	
Y-Zcut 41° Y-cut 64° Y-cut 127.86° Y-cut	150.0(mm) 100.0(mm)	0.25(mm) 0.35(mm) 0.50(mm)	Mirror Polished	GC#1000 GC#2000

Black-LT Black-LN

Specification of Bulk resistivity, Bulk conductivity

Black-LT Wafers

	Black-LT		Usual LT	Black-LN	
	Standard Black	Super Black		Standard Black	Usual LN
Bulk resistivity ($\Omega\text{-cm}$)	2.22*E+11	3.54E+10	1.90E+14	2.40E+10	1.20E+15
Bulk conductivity ($\Omega^{-1}\text{-cm}^{-1}$)	4.50E-12	2.80E-11	5.30E-15	4.17E-11	8.30E-16
Surface electric Potential** /100mφ(kv)	<0.40	<0.10	4.12	<0.05	3.05
Electrical charges neutralization(sec.)	3.7	1.5	∞	1.5	∞
Optical transmission(%)*20	65	<60	72	<60	73
Color	gray	dark gray	colorless	dark gray	colorless

*1) electrical charges occurring with temperature raising from room temperature to 95, at 4 inch LT wafer (42° Y-cut, 0.35 mm thickness)

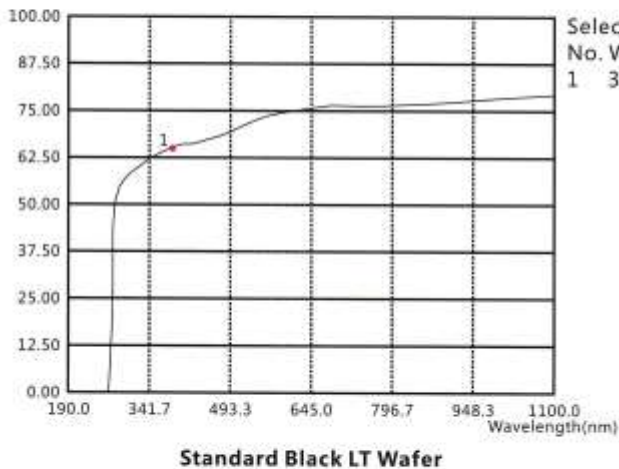
*2)transmissivity of 0.35 mm thickness wafer (with both side mirror polished) measured by 365 nm wavelength

SAW Properties

	LT 42° Y-cut		LN 127.86° Y-cut	
	LT	Black-LT	LN	Black-LN
Curie temp., Tc (°C)	605±3	605±3	1142±3	1142±3
SAW velocity	4022	Unchanged	3980	Unchanged
Coupling coefficient k ²	7.6	Unchanged	5.5	Unchanged

Optical Transmission Spectra

Wavelength Scanner



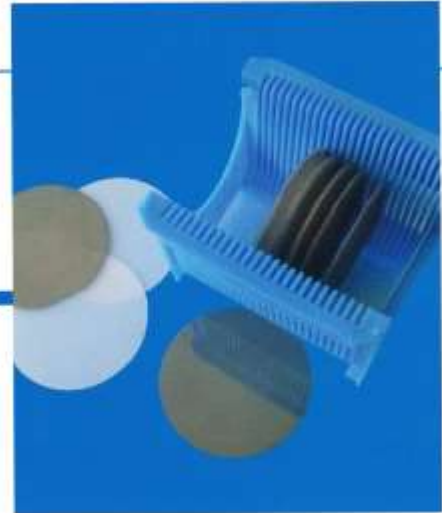
Select Point Data
No. Wavelength (nm) Data(T%)
1 365.0 63.5



Transmission Measurement Points

Easurementpoint	B-LN T(%),365nm	B-LT T(%),365nm
1	51.3	63.5
2	52.6	63.8
3	52.5	64.6
4	51.7	64.9
5	51.8	63.6
MAX	52.6	64.9
MIN	51.3	63.5
R	1.3	1.4

SAW Grade LiNbO_3 (LN) Wafer



Application:

SAW Devices

- ▶ Providing LN wafers with different cut types for SAW and BAW fabrications.
- ▶ Key properties influencing the yield of SAW devices are examined.
- ▶ And our patented product-free pyroelectric black or gray LN wafers, is also available.

Orientation	64°rot. Y-cut±0.2°	127.86°rot. Y-cut±0.2°	Y-cut±0.2°
Diameter	76.2±0.3mm 100.0±0.3mm 150.0±0.3mm		
Orientation Flat (OF)	22±2mm, 32±2mm, 47.5±2mm Perpendicular to X±0.2°		22±2mm, 32±2mm, 47.5±2mm Perpendicular to Z±0.2°
Second Refer Flat (RF)	10mm±3mm Cw180°±0.5°from OF	10mm±3mm Cw225°±0.5°from OF	10mm±3mm Cw270°±0.5°from OF
Thickness	500±20um, 350±20um		
Propagating Surface	"+" side Ra≤8Å		
wafer Backside	GC#1000 lapped & etched 0.2um≤Ra≤0.7um		
TTV	≤10um		
LTV	≤1.0um within an area of 5*5mm		
PLTV	≥95%(3mm from edge excluded)		
BOW	-25um≤Bows≤+25um		
Curie Temperature	1142°C±3°C (DTA method)		
Edge Beveling	Edge rounding		

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SAW Grade Crystal



Application:

SAW Devices

SAW grade LN, LT crystals are the featured products. Variation of SAW propagation velocity may arise from the fluctuation of crystal components, uncompleted crystal poling and crystal defects. So, to ensure the SAW propagation velocity consistent and to meet customer's higher and higher requirement on crystal quality, such strict measures as quality and precise component ratio control of Nb_2O_5 , Ta_2O_5 and Li_2CO_3 raw materials, Curie temperature measurement, defects inspection as well as optimized crystal growth and poling process, are taken.

Crystal Categories	LiNbO_3 Crystal	LiTaO_3 Crystal
Crystal Orientation	X, Y, Z, 36°Y, 41°Y, 45°Y, 64°Y, 128°Y, 135°Y	Z, 36° Y, 42° Y, X-112° Y
Orientation Fluctuation	±0.1°	
Diameter	76.2±0.5mm, 100.0±0.5mm, 150±0.5mm	
Length	50~150mm	
Curie Temperature	1142°C±3°C	605°C±3°C
Orientation of First Reference Flat	±0.2°	
First Reference Flat	22±2mm(3"), 32±2mm(4"), 47.5±2mm(6")	
Second Reference Flat	10±3mm, 12±3mm	
Quality	Free of Crack, bubbles and inclusions	

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