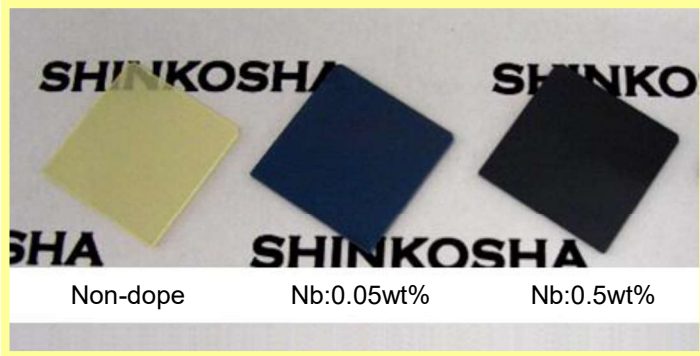
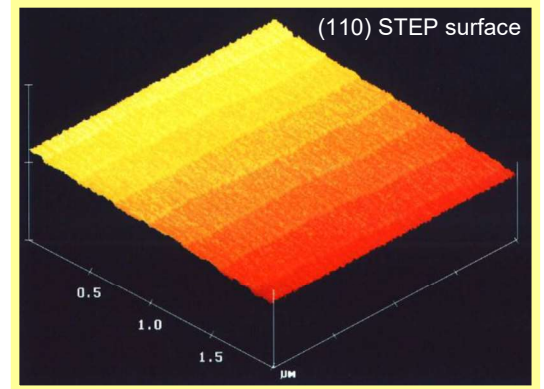


# TiO<sub>2</sub>(Rutile) Substrate

We offer world's best TiO<sub>2</sub>(rutile) substrates to make the fruits of your work excellent.

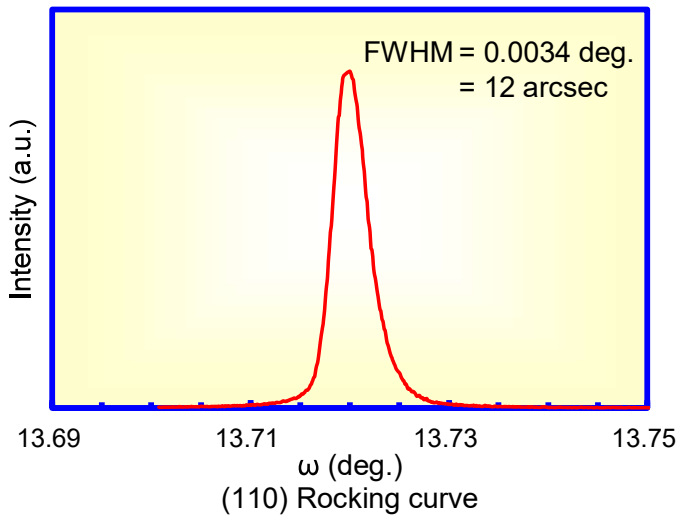
## 【Features】

- World's top-class crystal quality
- STEP substrates are also available.
- Electrically-conductive type is available by Nb doping.



## 【Characteristics】

Crystal system	Tetragonal
Crystal structure	Rutile
Space group	P4 <sub>2</sub> /mm
Lattice constant	a = 0.45935 nm c = 0.29580 nm
Melting point	1840 °C
Density	4.252 g/cm <sup>3</sup> (20°C)
Dielectric constant	113 (1MHz)
Thermal expansion	(// a-axis) 7.81 × 10 <sup>-6</sup> /°C (// c-axis) 10.1 × 10 <sup>-6</sup> /°C
Band gap	3.0 eV
Refractive index	n <sub>o</sub> = 2.5490 n <sub>e</sub> = 2.8226 (at 706.5nm)



## 【Standard Specs】

	TiO <sub>2</sub>	Nb:TiO <sub>2</sub>	
Nb concentration	0	0.05wt% (0.04at%)	0.5wt% (0.43at%)
Resistivity	>10 <sup>7</sup> Ω·cm	2.5~10 Ω·cm	0.20~0.35 Ω·cm
Orientation	(100), (001), (110) Tolerance : ±0.5°		
Size	10 × 10 × 0.5 mm, 15 × 15 × 0.5 mm Tolerance (outside dimension) : ±0.1 mm Tolerance (thickness) : ±0.05 mm		
Polishing	One-side / Both-side		
STEP	Available for (100), (110)		
Surface roughness	Ra ≤ 1.0nm, Rmax ≤ 5.0nm		
Flatness	10 × 10 × 0.5 mm : ≤λ, 15 × 15 × 0.5 mm : ≤1.5λ (λ=632.8 nm)		

If you are looking for other specs, please contact us.

All figures in graph and table are typical data (not guaranteed).

# TiO2 Model list

Doping	Size (mm)	Polishing	Surface treatment	Orientation		
				(100)	(110)	(001)
None	10x10x0.5	One-side	Normal	○	○	○
	"	Both-side	"	△	△	○
	"	One-side	STEP	△	△	—
	15x15x0.5	One-side	Normal	○	○	○
	"	Both-side	"	△	△	○
	"	One-side	STEP	△	△	—
Nb:0.05wt%	10x10x0.5	One-side	Normal	○	○	△
	"	Both-side	"	△	△	△
	"	One-side	STEP	△	△	—
	15x15x0.5	One-side	Normal	○	○	△
	"	Both-side	"	△	△	△
	"	One-side	STEP	△	△	—
Nb:0.5wt%	10x10x0.5	One-side	Normal	○	○	△
	"	Both-side	"	△	△	△
	"	One-side	STEP	△	△	—
	15x15x0.5	One-side	Normal	○	○	△
	"	Both-side	"	△	△	△
	"	One-side	STEP	△	△	—

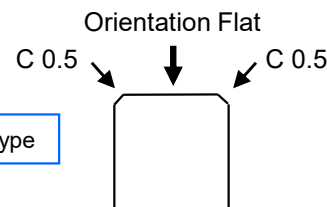
○ : Standard    △ : Made-to-order

If you are looking for different sizes, offset angle type and others, please contact us.

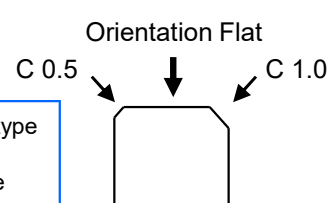
\*Minimum order for STEP model, made-to-order model and special model : 5pcs

## Orientation Flat

One-side polished type



Both-side polished type & Offset angle type



## Model Number

Polishing  
S : One-side  
W : Both-side

Surface treatment  
N : Normal  
S : STEP

TO - AS - 10N - N05

Orientation  
A : (100)  
D : (110)  
C : (001)  
E : (101)  
G : (111)

Size  
10 : 10 × 10 × 0.5 mm  
15 : 15 × 15 × 0.5 mm

Dopant  
No entry : Non doped  
N05 : Nb 0.05wt%  
N50 : Nb 0.5wt%

<Visual check note>  
We pass over the following:  
(a) Chips within 0.2mm from the circumference of substrates  
(b) Chips on the edge strip under 1/2 size of substrate thickness  
(c) Scratches and blemish on the back side of single-side polished substrates

Substrate Orientation	Orientation Flat
(100)	(001)
(110)	(110)
(001)	(110)
(101)	(100)
(111)	(110)