

## LONGi P-Type M2 Monocrystalline Brick Specification

### 隆基 P 型 M2 单晶硅棒规格书

#### 1、Material properties 材料性能

Property 项目	Specification 规格	Inspection Method 检测方法
Growth method 生长方式	CZ 直拉法	--
Crystallinity 结晶性	Monocrystalline 单晶	Preferential Etch Techniques (ASTM F47-88) 择优化学腐蚀法
Conductivity type 导电类型	P-type P 型	Napson EC-80TPN P/N 型测试仪
Dopant 掺杂元素	Boron 硼	--
Oxygen concentration [Oi] 间隙氧含量	$\leq 9E + 17 \text{ at/cm}^3$	FTIR (ASTM F121-83) 傅里叶变换红外光谱仪
Carbon Concentration [Cs] 替位碳含量	$\leq 5E + 16 \text{ at/cm}^3$	FTIR (ASTM F123-91) 傅里叶变换红外光谱仪
Etch pit density (dislocation density) 位错密度	$\leq 500 \text{ cm}^{-2}$	Preferential Etch Techniques (ASTM F47-88) 择优化学腐蚀法
Surface orientation 表面晶向	$\langle 100 \rangle \pm 3^\circ$	X-ray Diffraction Method (ASTM F26-1987) X 射线衍射仪
Orientation of pseudo square sides 侧面晶向	$\langle 010 \rangle, \langle 001 \rangle \pm 3^\circ$	X-ray Diffraction Method (ASTM F26-1987) X 射线衍射仪

## 2、Electrical properties 电性能

Property 项目	Specification 规格	Inspection Method 检测方法
Resistivity 电阻率	<input type="checkbox"/> 0.5-1.5 $\Omega$ .cm (After anneal) 退火后测试 <input type="checkbox"/> 0.8-2.6 $\Omega$ .cm (After anneal) 退火后测试 <input type="checkbox"/> Other _____	四探针电阻率测试仪 4-probe resistivity measurement
MCLT (Minority carrier lifetime) 少数寿命	$\geq 20\mu\text{s}$	Sinton BCT-400 QSSPC 准稳态光电导衰减法 /Transient 瞬态光电导衰减法 (with injection level: $1\text{E}15 \text{ cm}^{-3}$ )

## 3、Geometry 几何尺寸

Property 项目	Specification 规格	Inspection Method 检测方法
Geometry 几何外形	Quasi square 准方	Vernier caliper
Diameter 直径	210 $\pm 0.25$ mm	Vernier caliper
Flat to flat 对边距	156.75 $\pm 0.25$ mm	Vernier caliper
Corner length 弧长投影	8.5 $\pm 0.5$ mm	Wide-seat square/ruler
Angularity 垂直度	90 $\pm 0.2^\circ$	Angle ruler
Corner shape 倒角边形状	Round shape	Visual inspection
Perpendicularity 端面垂直度	$\leq 0.8$ mm	
Length 长度	1、650 $\pm 3$ mm 2、325 $\pm 2$ mm 3、X, $X \in [100, 322] \cup [328, 646]$	Length $\geq 400$ mm, tolerance $\pm 3$ mm Length $< 400$ mm, tolerance $\pm 2$ mm

#### 4、Surface properties 表面性能

Property 项目	Specification 规格	Inspection Method 检测方法
Surface quality 表面质量	Stain, Oil, Scratch, Crack, Pit, Bump, Pinhole and Twin defect are not allowed.	Visual inspection
Chip 崩边	Surface chip is not allowed; Arris: chips are inconsecutive: Less than 10 on the arris, dia $\leq$ 0.3mm;	Ruler
Surface roughness 表面粗糙度	Plane surface : Ra $\leq$ 0.6 $\mu$ m; Cambered surface : Ra $\leq$ 1.0 $\mu$ m	Surface roughness meter

LONGi Silicon