

## Monocrystalline Silicon Wafer

**Full Square   N-type   156 mm   180/200/220 μm**

### 1. Crystal- and material properties

Property	Target	Unit	Lower Limit	Upper Limit	Standard
<b>Ingotting method</b>	CZ				
<b>Crystallinity</b>	Monocrystalline	–	–	–	
<b>Conductivity type</b>	N-type	–	–	–	SEMI MF 42-02
<b>Dopant</b>	Phosphorous	–	–	–	
<b>Oxygen concentration [O<sub>i</sub>]</b>	–	at/cm <sup>3</sup>	–	1E+18	ASTM F 121-83
<b>Carbon concentration [C<sub>s</sub>]</b>	–	at/cm <sup>3</sup>	–	5E+16	ASTM F 123-86
<b>Etch pit density (dislocation density)</b>	–	cm-2	–	300	SEMI MF 1725-1103
<b>Surface orientation</b>	<100>	–	– 3°	+ 3°	SEMI MF 26-0305
<b>Orientation of square sides</b>	<010> <001>	–	– 3°	+ 3°	SEMI MF 26-0305

### 2. Electrical properties

Property	Target	Unit	Lower Limit	Upper Limit	Standard
<b>Resistivity (variant 1)</b>	–	Ωcm	0.5	3.5	SEMI MF 43-99
<b>Other dopants' concentration</b>	–	ppba	–	45 (no umg-Si)	
<b>Lifetime</b>	–	μs	100	–	SEMI MF 1535-1104

### 3. Geometry

Property	Target	Unit	Lower Limit	Upper Limit	Standard
<b>Geometry</b>	square with bevels	–	–	–	
<b>Side length</b>	156.0	mm	– 0.5	+ 0.5	
<b>Angle between adjacent sides</b>	90	°	– 0.2	+ 0.2	
<b>Bevel edge shape</b>	flat	–	–	–	
<b>Bevel cathetus</b>	1	mm	– 0.33	+ 0.33	
<b>Bevel edge angle</b>	45	°	– 10	+ 10	
<b>Average thickness (over 1 wafer)</b>	180/200/220 (= “nominal thickness”)	μm	– 30	+ 30	SEMI MF 533-02a
<b>Thickness mean (over the delivery)</b>	180/200/220 (= “nominal thickness”)	μm	–5	+5	
<b>TTV (Total thickness variation)</b>	–	μm	–	50	SEMI MF 533-02a

## 4. Surface properties

Property	Specification	Unit	Lower Limit	Upper Limit	
<b>Surface quality</b>	as-cut and cleaned; no visible contamination as oil or grease, finger prints, soap stains, slurry stains, epoxy/water stains, (Detection equipment: Hennecke system)	-	-	-	
<b>Saw marks / steps</b>	(Detection equipment: Hennecke system)	µm	-	20	
<b>Chippings</b>	below 1 mm from the edge are allowed				
<b>Micro cracks/ inclusions/holes</b>	No allowed (Detection equipment: Hennecke system)				

## 5. Packaging

Property	Target	Unit	Lower Limit	Upper Limit	
<b>Packing method</b>	Wafer stacks in shrink foil packed in styrofoam boxes packed in cardboard cartons	-	-	-	
<b>Labelling on each styrofoam boxes</b>	Supplier, Date / Time, Ingot No., Box No., Amount of wafers, Thickness, Furnace Run, Furnace No., Supplier's internal Order No.	-	-	-	
<b>Labelling on each cardboard carton</b>	Supplier, Carton No., Wafer description (thickness, size, Crystallinity), Article No., Amount of wafers per cardboard carton, Amount of boxes, Date	-	-	-	