

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 |
|---|-----------------|--------------------|-------------|-------------|-------------------|
| Ingotting method | CZ | | | | |
| Crystallinity | Monocrystalline | – | – | – | |
| Conductivity type | N-type | – | – | – | SEMI MF 42-02 |
| Dopant | Phosphorous | – | – | – | |
| Oxygen concentration [O_i] | – | at/cm ³ | – | 1E+18 | ASTM F 121-83 |
| Carbon concentration [C_s] | – | at/cm ³ | – | 5E+16 | ASTM F 123-86 |
| Etch pit density (dislocation density) | – | cm-2 | – | 300 | SEMI MF 1725-1103 |
| Surface orientation | <100> | – | – 3° | + 3° | SEMI MF 26-0305 |
| Orientation of square sides | <010> <001> | – | – 3° | + 3° | SEMI MF 26-0305 |

2. Electrical properties

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

3. Geometry

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

4. Surface properties

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

5. Packaging

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