norwegiancrystals

# Technical specification Sheet

Norwegian Crystals – P–type D210 156,75mm x 156,75mm x 160µm – Mono

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## 1 Crystal, chemical and material properties

| Property | Specification | Control frequenzy | Measuring Methodes | References |
|---|---|---|---|---|
| Crystal Growing method | CZ | - | - | - |
| Crystal Structure | Mono-crystalline | - | - | - |
| Crystal Orientation | <1-0-0> +/- 3° | - | - | - |
| Conductivity Type | P-type | Each block | - | - |
| Dopant | Boron | - | - | - |
| Oxygen Concentration[1] | ≤ 9,0 x $10^{17}$ atoms/$cm^3$ [≤ 18 ppma] | Each mother ingot - center value, seed and tail | FTIR | (new) ASTM F121 - 83 |
| Carbon Concentration[2] | ≤ 1,0 x $10^{17}$ atoms/$cm^3$ [≤ 2.0 ppma] | Each mother ingot - center value, seed and tail | FTIR | ASTM F1391-93a |

## 2 Electrical and Chemical properties

| Property | Specification | Control frequenzy | Measuring Methodes | References |
|---|---|---|---|---|
| Specific Resistivity[3] | 0.8 - 1.5 Ohmcm | Each mother ingot - center value, seed and tail | 4-point probe | ASTM F84 |
| Bulk Lifetime[4] | ≥ 50 µs | Each mother ingot - surface value, seed and tail | Sinton | QSS |
| Defects[5] | No slip lines | Each mother ingot - seed and tail | Visual and PL-camera | - |

## 3 Geometry

| Property | Specification | Control frequenzy | Measuring Methodes | References |
|---|---|---|---|---|
| Wafer Shape | Pseudo square | - | - | - |
| Wafer Size - flat to flat | 156,75 mm +/- 0,25 mm | Continous | Vision system | - |
| Wafer Diameter | 210 mm +/- 0,25 mm | Continous | Vision system | - |
| Corner edge length | 8.5 mm +/- 0.5 mm | Continous | Vision system | - |
| Right Angel [ΦI] | 90° +/- 0,2° | Continous | Vision system | - |
| Thickness | 160µm +20µm/-10µm | Continous | Vision system | - |
| Bow | ≤ 50 µm | Continous | Vision system | - |
| Warp | ≤ 70 µm | Continous | Vision system | - |
| TTV | < 30 µm | Continous | Vision system | - |

## 4 Surface Properties

| Property | Specification | Control frequenzy | Measuring Methodes | References |
|---|---|---|---|---|
| Wafer Slicing | Water Based Diamond Wafering | - | - | - |
| Wafer Cleaning | Water + Detergent | - | - | - |
| Wafer Surface | As cut - No stains exp. A) Water stains B) Stains from Si dust | Continous | - | - |

## 5 Apperance

| Property | Specification | Control frequenzy | Measuring Methodes | References |
|---|---|---|---|---|
| Edge Defect | Length ≤ 0,5 mm, Width ≤ 0,3 mm, max 1 | 100% - Stacks of 100 pieces | Visual | - |
| Saw Marks | Depth ≤ 15 µm | Continous | Vision system | - |
| V chip | Not allowed | Continous | Vision system | - |
| Crack and Pin Holes | No cracks. No Pin Holes | Continous | IR - Camera | - |

## 6 Packaging

| Property | Specification |
|---|---|
| Packaging Method | EPS boxes packed in cardboard cartons and wooden pallet |
| Information on each EPS box | Product name, thickness, ingot lot, quantity, packaging date and inspector |
| Information on each pallet | Pallet number |
| Statistical quality criteria | AQL 1,0 - Inspection level II. AQL items are thickness, sawmarks, dimension and visual surface defects/Appearance |

## 7 Illustration