18.02.2016

Technical specification Sheet

Norwegian Crystals – P-type D210 156,75mm x 156,75mm x 180/200µm – Mono

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/cm³ (≤ 18 ppma)	Each mother ingot - center value, seed and tail	FTIR	(new) ASTM F121 - 83
Carbon Concentration[2]	≤ 5,0 x 10^{16} atoms/cm³ (≤ 1.0 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]	1.0 - 2.5 Ohmcm	Each mother ingot - center value, seed and tail	4-point probe	ASTM F84
Bulk Lifetime[4]	≥ 100 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	210 mm +/- 0,25 mm	Continous	Vision system	-
Wafer Diameter	156,75 mm +/- 0,25 mm	Continous	Vision system	-
Corner edge length	8.5 mm +/- 0.5 mm	Continous	Vision system	-
Right Angel (Φ1)	90° +/- 0,2°	Continous	Vision system	-
Thickness	180/190 µm +20µm/-20µm	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