Blank Material, Silicon Test Mass (ETM/ITM), 40m Mariner

Authors	Date	Document Change Notice, Release or Approval
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Requirements

Physical dimensions	Right circular cylinder: 150 mm × 150 mm ⌀
Clear aperture	Central 30 mm diameter
Material	Monocrystalline silicon, float zone
Dopants	Undoped; best effort for minimal residual dopant contamination
Resistivity	> 30 kΩ cm; radial variation and striation ± 20% in clear aperture
Interstitial oxygen	$< 10^{16}/cm^3$
Micro defects	Voids only; density $< 10^3/cm^3$
Bubbles/inclusions	Total cross section in clear aperture is < 10000 square micrometers No bubbles > 100 micron diameter; disregard bubbles < 10 micron diameter
Crystal orientation	Flat surfaces of cylinder aligned with {100} crystal plane, ±1°
Index homogeneity	$\leq 2.5 \times 10^{-6}$ peak-to-valley; $\leq 5 \times 10^{-7}$ peak-to-valley in clear aperture
Birefringence	≤ 5 nm/cm; ≤ 1 nm/cm in clear aperture
Final shaping	Performed using a grit size progression ending with a 320 or smaller grit tool
Defect depth	< 0.5 mm on any surface or corner
Serial number	Serialized as TMXX, where XX increments starting at 01

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Specification	Method	Inspection Frequency	Data Delivered
Physical dimensions	Inspection	100%	Certification
Material	Process control Material certification	100%	Certification
Dopants	Process control Material certification	100%	Certification
Resistivity	Process control Material certification	100%	Certification
Interstitial oxygen	Process control Material certification	100%	Certification
Micro defects	Process control Material certification	100%	Certification
Bubbles/inclusions	Infrared imaging	100%	Hand sketch indicating location and dimensions
Crystal orientation	Process control Material certification	100%	Certification
Index homogeneity	Interferometric measurement	100%	Inspection report included with certification
Birefringence	Infrared polariscope	100%	Inspection report included with certification
Defect depth	Visual inspection	100%	Certification
Serial number	Visual inspection	100%	Certification

Table 1: MEASUREMENT MATRIX: FREQUENCY AND METHOD