ZENMAT

深圳臻材科技

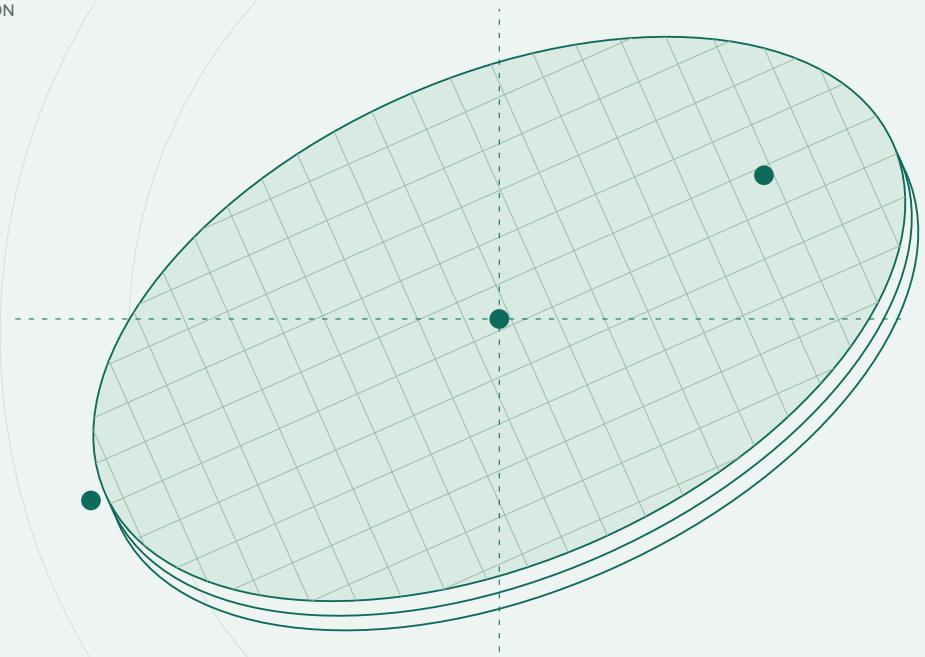
TECHNICAL SPECIFICATION / EN

Indium phosphide substrates

Technical specification

Requirements, inspection & acceptance

MATERIAL GEOMETRY / ILLUSTRATION



InP

INDIUM PHOSPHIDE

ZC-INP-TS-EN / REV 2.0

2026.09

Preliminary. Availability and warranted limits require written confirmation.

Basis: GB/T 20230-2022 | Technical content dated 16 Sep 2026

01 SCOPE, DESIGNATION & ELECTRICAL LIMITS

Values in this document are the requirements of GB/T 20230-2022. Availability by diameter, dopant and grade, and the supplier's warranted limits, must be confirmed in the agreed purchase specification.

This specification covers 2-, 3-, 4- and 6-inch InP single-crystal polished wafers. Record any special orientation, dimensions, particle limits or tighter requirements explicitly in the agreed purchase specification.

Designation format

[Growth method]-InP-[diameter]-[type(dopant)]-[(orientation)P/E or P/P]-[grade]

Example: LEC-InP-76.2-p(Zn)-(100)P/P-II. This illustrates the designation in clause 4.2; it is not an available product code. Confirm growth method and ordering codes with the supplier.

Electrical properties — Table 1

Type / dopant	Resistivity Ω·cm	Carrier concentration cm^{-3}	Mobility $cm^2/(V·s)$
n / S	0.1×10^{-3}–6×10^{-3}	$\geq8\times10^{17}$	≥1,000
n / Sn	1×10^{-3}–6×10^{-3}	$\geq5\times10^{17}$	≥1,000
n / Undoped	—	$\leq1\times10^{16}$	≥3,500
p / Zn	—	$\geq5\times10^{17}$	≥50
SI / Fe	$\geq1\times10^{7}$	—	≥1,000

SI means semi-insulating. "—" indicates that the standard sets no numerical value for that item.

Dislocation-density grades — Table 2

I	II	III	IV	V
$\leq5\times10^{2}$	$\leq5\times10^{3}$	$\leq1\times10^{4}$	$\leq5\times10^{4}$	$\leq1\times10^{5}$

Unit: cm^{-2}. Ingot growth orientation: 〈100〉.

Under clause 5.2.1, wafer electrical and dislocation properties are supported by test results for the corresponding ingot. Maintain traceability from the ingot to each wafer lot.

02 DIMENSIONS, ORIENTATION & SURFACE

Size	Diameter D mm	Thickness µm	Primary flat L1 mm	Secondary flat L2 mm
2″	50.8±0.5	350±25	16.0±2.0	8.0±2.0
3″	76.2±0.5	600±25	22.0±2.0	11.0±2.0
4″	100.0±0.5	625±25	32.5±2.0	18.0±2.0
6″	150.0±0.5	675±25	Notch	N/A

Source: Table 4. Use the specified metric dimensions for acceptance; nominal inch sizes are not exact inch-to-millimeter conversions.

Size	TTV / µm P/E / P/P	Warp / µm P/E / P/P	TIR / µm P/E / P/P
2″	≤8 / ≤6	≤10 / ≤8	≤6 / ≤6
3″	≤10 / ≤8	≤12 / ≤10	≤8 / ≤6
4″	≤12 / ≤10	≤15 / ≤12	≤10 / ≤8
6″	— / ≤20	— / ≤20	— / ≤15

P/E: polished front, etched back. P/P: both sides polished. The unspecified 6-inch P/E limits require separate agreement.

Orientation / alignment	Requirement
Wafer surface orientation	(100)±0.3°
Primary flat orientation	(0 −1 −1)±0.5°
Secondary flat position	90°±5° clockwise from the primary flat
Notch datum-axis orientation	(010)±1°

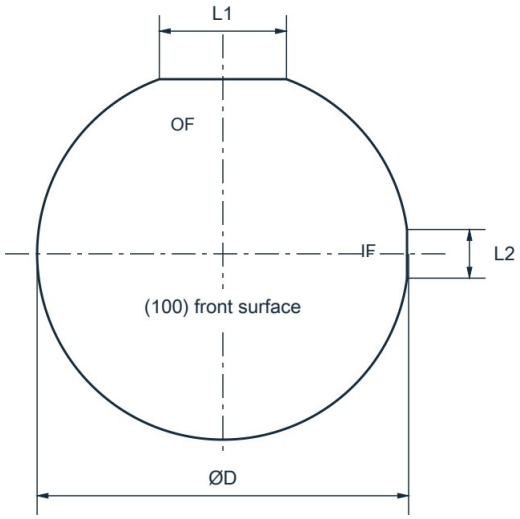
Source: Table 3. Minus signs denote overbarred Miller indices.

The front surface shall be free from twins, scratches, orange peel, pits, haze, contamination, edge chips, cracks and other abnormalities. For particles ≥0.5 µm, limits are ≤100, ≤200, ≤400 and ≤600 per wafer for 2-, 3-, 4- and 6-inch sizes.

Sources: clauses 5.2.4–5.2.5 and Table 5. Special particle limits require agreement.

03 TWO-FLAT WAFER DRAWING

2 / 3 / 4 inch wafer | Front view and edge view



Size	ØD	L1	L2
2 in	50.8±0.5	16.0±2.0	8.0±2.0
3 in	76.2±0.5	22.0±2.0	11.0±2.0
4 in	100.0±0.5	32.5±2.0	18.0±2.0



t = 0.350 / 0.600 / 0.625 ±0.025

Thickness exaggerated for visibility.

OF: primary flat; IF: secondary flat.

IF is 90°±5° clockwise from OF.

Orientation and surface finish: see specification. Edge profile is not defined by this schematic.

ZENMAT	ZC-INP-D01 / Rev. 2.0	GB/T 20230-2022
UNITS: mm | SCHEMATIC / DO NOT SCALE	16 Sep 2026	TECHNICAL REFERENCE

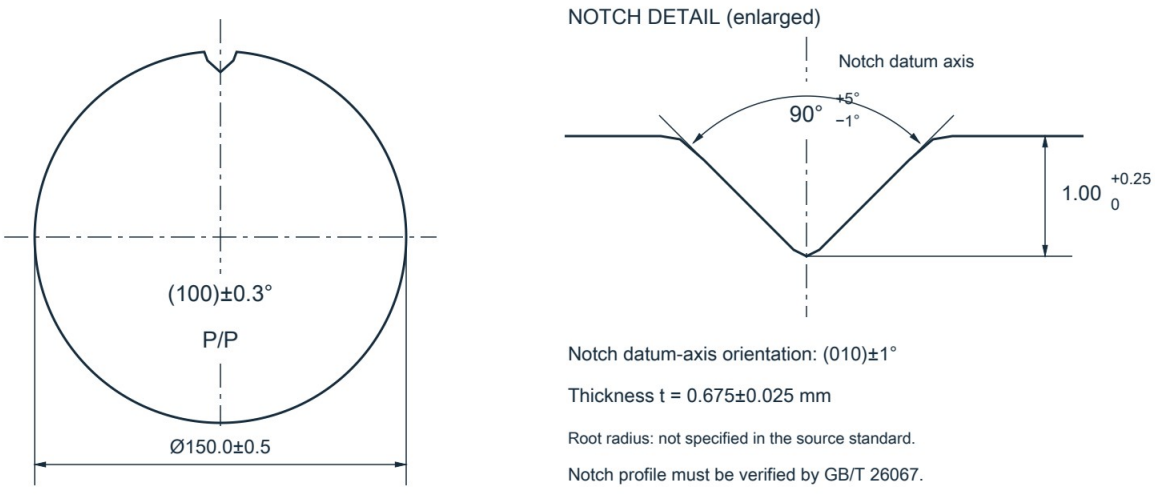
Drawing ZC-INP-D01 applies to 2-, 3- and 4-inch wafers. Viewed from the front, the primary flat is at the top and the secondary flat is 90°±5° clockwise from it.

Drawing convention	Requirement
Line types	Thick continuous visible outlines; thin dimension and extension lines; thin chain centerlines
Units and scale	Dimensions in mm. Written dimensions govern; do not scale the schematic
Thickness	2 / 3 / 4 inch: 0.350 / 0.600 / 0.625 mm, tolerance ±0.025 mm
Edge profile	Define bevel or edge-rounding geometry in the mutually approved product drawing

> Line and dimension conventions reference GB/T 4457.4-2002 and GB/T 4458.4-2003; product dimensions follow GB/T 20230-2022. This schematic is not a released manufacturing drawing. Use mutually approved model drawings for manufacture and acceptance.

04 SIX-INCH NOTCHED WAFER

6 inch wafer | Notch detail



Notch datum-axis orientation: (010)±1°

Thickness t = 0.675±0.025 mm

Root radius: not specified in the source standard.

Notch profile must be verified by GB/T 26067.

Source: GB/T 20230-2022, Tables 3–4 and Fig. 1. Notch drawn oversized in the wafer overview.

ZENMAT	ZC-INP-D02 / Rev. 2.0	GB/T 20230-2022
UNITS: mm | SCHEMATIC / DO NOT SCALE	16 Sep 2026	TECHNICAL REFERENCE

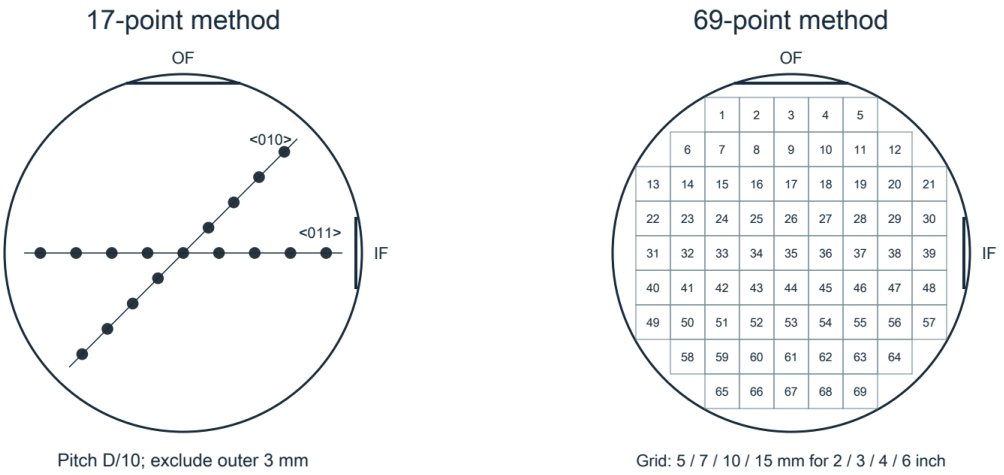
Feature	Requirement
Diameter / thickness	150.0±0.5 mm / 675±25 µm
Notch angle	90°; upper deviation +5°, lower deviation −1°
Notch depth	1.00 mm; upper deviation +0.25 mm, lower deviation 0
Notch datum-axis orientation	(010)±1°
Dimensional measurement	GB/T 26067

Sources: GB/T 20230-2022, Tables 3–4, Figure 1 and clause 6.2.2.3.

The notch detail is enlarged. The source standard does not specify a root radius, so no radius is assigned here. Add any equipment-interface constraints to the agreed order drawing.

> Confirm 6-inch availability, qualification status and measured performance before placing an order.

05 DISLOCATION MEASUREMENT & REPORTING



METHOD DIAGRAM / NOT MEASUREMENT DATA | GB/T 20230-2022, Annex A

Annex A recommends whole-wafer distributed counting below 5,000 cm^{-2}, with the counting method agreed by both parties. The 17-point method excludes the outer 3 mm and samples at D/10 intervals along 〈010〉 and 〈011〉 directions separated by 45°.

The distributed method uses 69 points at grid-cell centers. Grid pitches for 2 / 3 / 4 / 6 inch wafers are 5 / 7 / 10 / 15 mm. A grid cell is not the microscope counting field.

Estimated density N^d / cm^{-2}	Minimum field area S / cm^2
$N^d \le 5{,}000$	0.01
$5{,}000 < N^d \le 10{,}000$	0.005
$10{,}000 < N^d \le 50{,}000$	0.001
$N^d > 50{,}000$	0.0005

$N_i = N / S$; $N^d = (\Sigma N_i) / n$

N is the dislocation etch-pit count, S the corresponding field area and n the number of points. Report the arithmetic mean of point densities; exclude flat-bottom pits. The report must identify the sample / wafer, point count, field area, density, operator and test date.

06 INSPECTION & ACCEPTANCE

Inspection item	Method
Conductivity type and n/p electrical properties	GB/T 4326; resistivity requirement applies to n-type
SI resistivity and mobility	SJ/T 11488
Ingot / wafer orientation	GB/T 1555
Primary flat / notch axis	GB/T 13388
Secondary flat position	Angle gauge of adequate accuracy
Diameter and flat lengths	Gauge accuracy: 0.02 mm
Thickness	GB/T 6618, vertical five-point method
TTV / Warp / TIR	GB/T 32278
Surface quality / particles	GB/T 6624 / GB/T 19921
Dislocation density	GB/T 20230-2022, Annex A

Lots, sampling and decisions

An ingot lot consists of one ingot. Take one wafer from each end for electrical, orientation and dislocation testing; inspect every ingot visually. Wafer lots share one designation and traceable production conditions.

For wafer orientation / marking, geometry, surface quality and particles, use GB/T 2828.1-2012: special level S-2, normal single sampling, AQL 6.5. Determine sample size and acceptance / rejection numbers (Ac/Re) from lot size. AQL is not a permitted defect percentage for each lot.

Failed ingot electrical, orientation or dislocation items may be retested using twice the sample count; any further failure rejects the ingot. A visual failure rejects it directly. Wafer decisions follow Table 7 or agreement. The standard provides for written buyer objections within three months of receipt; arbitration is mutually agreed.

07 PACKAGING & DELIVERY DOCUMENTS

Place each polished wafer in an individual clean carrier. Seal in clean plastic and aluminum-foil bags under vacuum or nitrogen, then pack in a shipping carton. If ingots are supplied separately, use a clean plastic bag, grooved foam and an outer carton.

Label location	Required information
Wafer carrier	Product name, designation, lot number and other agreed information
Shipping carton	Supplier name / trademark, product name, specification, quantity and shipment date
Handling marks	Handle with care; protect from moisture and corrosion; fragile

Lot documentation

Document	Minimum content
Quality certificate / lot test report	Supplier and buyer, contract / PO, product specification and designation, lot, quantity, test results, quality-department mark and inspector stamp
Certificate of Conformity (CoC)	Inspection items and results, lot, inspection date, inspector signature or stamp
Inspection reports and handling instructions	In-process and final inspection reports; handling, use and storage instructions

Batch documents also include supplier / product information, standard number and shipment or packaging date. Preserve the required contents of both the quality certificate and CoC; a declaration without test results is not a substitute for the lot report.

Transport, storage and opening

Handle gently; do not throw or compress packages. Protect against shock and moisture and store in a clean, dry environment. Avoid contamination and contact with polished surfaces when opening and handling. Numerical storage conditions, shelf life, post-opening instructions and SDS must be confirmed by the supplier.

08 PURCHASE SPECIFICATION & REFERENCES

Complete and agree the fields below. Blank fields are not supply commitments.

Purchase specification	Entry
Buyer / PO reference	_____
Quantity, ship-to, destination and date	_____
Designation, growth method and dopant	_____
Diameter, thickness and tolerances	_____
Orientation, alignment and surface finish	_____
Dislocation grade and electrical limits	_____
TTV, Warp, TIR and particle limits	_____
Methods, sampling and reports	_____
Packaging, special terms and approvals	_____

Include GB/T 20230-2022 and any supplemental technical agreement in the PO (clause 9). Supplier contacts, actual models, warranted limits and original reports remain to be confirmed.

Standards & peer literature

[1] GB/T 20230-2022 — Indium phosphide single crystal
[2] Sumitomo Electric — n-type InP substrates
[3] JX Advanced Metals — InP substrate catalog
[4] AXT — Semiconductor substrate portfolio
[5] Qingdao Haohan Quancai — InP wafers
[6] Vital Materials — Compound semiconductor materials
GB/T 4457.4-2002 — Drawing lines
GB/T 4458.4-2003 — Dimensioning

Reviewed: 16 Sep 2026. Technical requirements come from GB/T clauses 4–9, Tables 1–7, Figure 1 and Annex A. Peer literature informed presentation only.

ZENMAT is the company’s English brand name. This customer edition explains the cited Chinese standard; it is not an official English edition of that standard. Agree any language precedence in the contract.