DaMing OEM Touch & Display Solutions White Paper

Complete English Engineering Edition V2.1 (Unified Capability Envelope, Facility Baseline & RFQ Checklist)

Legal Entity: Shenzhen Daming Optoelectronic Technology Co., Ltd.
Brand Identity: DaMing (DaMing Touch & Display)
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Scope Notice: This white paper distinguishes verified capabilities and company-stated facility/capacity baselines from project-confirmed scope and general engineering design guidelines. It contains no SEO/GEO or website-promotion strategy. While company-stated facility baselines (established 2018, ≈ 5,500 m² plant, Class 100 / Class 1,000 cleanrooms, and ≈ 1.5 million pieces/month overall capacity) reflect current manufacturing scale, they do not constitute an automatic capacity reservation, SLA, or delivery lead-time guarantee for any individual Purchase Order (PO). All final technical, certification, line-allocation, and delivery commitments are governed by signed contracts, controlled drawings, and approved specifications.

How to Read Statements in This Document:
`[VERIFIED]` Company positioning, product scope, facility scale, or in-house process supported by the verified internal baseline.
`[PROJECT]` Project-specific parameters (including PO line allocation, MOQ, lead time, and process window) confirmed via drawings, samples, testing, quotation, or contract.
`[DESIGN RULE]` Non-binding industry reference baselines provided to assist hardware engineers during initial DFM architecture and tolerance budgeting.

Contents Overview

Sec.	Engineering Topic	Sec.	Engineering Topic
01	Executive Summary	09	Bonding & Optical Stack (≤ 32" Full Bonding)
02	Company Positioning, Facilities & Size Envelope	10	Mechanical Integration & Tolerance (Datum Diagram)
03	Integrated OEM Value Proposition & Supply Chain	11	Electrical, EMC & Host Software Mitigation
04	Requirements & DFM Review Baseline	12	Prototype, Sample (EVT/DVT/PVT) & Validation
05	Cover Lens & Front-Panel Design Guidelines	13	Reliability & Quality Planning (A/B/C Zone Rules)
06	PCAP Sensor Architecture & Touch Control	14	Production Introduction, Capacity & Change Control
07	FPC, Connector & Interface Design Rules	15	Packaging, Logistics & Lifecycle Management
08	Display Module & Optical Matching (≤ 10.1" In-House)	16	Interactive Project Start RFQ Checklist & Conclusion

01 Executive Summary

- **System-Level Alignment Challenge:** The hardest part of an OEM touch-display project is rarely a single component. It is the rigorous mechanical, optical, and electrical alignment of the cover lens, PCAP sensor, FPC, touch controller, display module (LCM), optical bonding stack, enclosure bezel, host board, and operating system software interfaces.
- **Core Engineering Proposition:** DaMing (DaMing Touch & Display) uses custom PCAP touch engineering as the technical core, connecting cover lens fabrication, touch sensor design, display resource matching, optical bonding, and project-supplied accessories through one reviewable, revision-controlled development path. Our engineering objective is to eliminate interface omissions, avoid repeated tooling/sample iterations, and prevent costly late-stage production changes.
- **Governance & Commercial Boundary:** This white paper supports pre-project engineering alignment and DFM review. It does not replace a formal quotation, controlled engineering drawing, product specification, compliance certificate, laboratory test report, or signed quality agreement.

02 Company Positioning, Facility Scale and Capability Boundaries

- `[VERIFIED]` **Corporate Profile & Facility Baseline:** Established in **2018**, **Shenzhen Daming Optoelectronic Technology Co., Ltd.** operates under the **DaMing** (**DaMing Touch & Display**) brand. Company-stated manufacturing infrastructure comprises an approximately **5,500 m²** production facility equipped with **Class 100 and Class 1,000 cleanrooms** (specific cleanroom class applicability per process stage is confirmed per program) and a company-stated overall manufacturing capacity of approximately **1.5 million pieces/month**.
- `[VERIFIED]` **Unified Three-Line Size Envelope:** DaMing focuses on custom PCAP touch panels (**G+F, G+F+F, and G+G** structures), PMMA/PC/glass capacitive touch-key panels, decorated cover lenses, display modules, and integrated touch-display assemblies governed by three distinct dimensional boundaries:
  - **In-House LCM Production: ≤ 10.1"** (larger display sizes are fulfilled via project-sourced Tier-1 modules or customer-consigned displays).
  - **Custom PCAP Touch Panels: 0.96"–55"** (custom sensor, cover lens, and touch-panel assemblies).
  - **Full Optical Bonding: ≤ 32"** (in-house cover-to-touch-to-display full optical lamination; 55" touch capability does not imply 55" full optical bonding).
- `[PROJECT]` **Project-Confirmed Scope:** Specific display sourcing above 10.1" (including Tier-1 original panels from **BOE, AUO, Tianma, Innolux, IVO, CSOT**, or customer-consigned LCMs), high-brightness outdoor backlight adaptations, driver/Android boards, cables, connectors, material grades, certifications, per-PO line allocation, MOQ, lead time, and reliability targets require explicit project confirmation. In-house and partner-outsourced work are clearly distinguished in commercial and quality documents.

Capability / Infrastructure Dimension	Verified / Company-Stated Baseline	Engineering & Commercial Boundary Rule
In-House LCM Production	**≤ 10.1"** `[VERIFIED]`	In-house custom LCM assembly up to 10.1"; displays > 10.1" proceed via project-managed Tier-1 sourcing or customer-consigned panels `[PROJECT]`.

Capability / Infrastructure Dimension	Verified / Company-Stated Baseline	Engineering & Commercial Boundary Rule
PCAP Touch Panel Span	**0.96"–55" [VERIFIED]**	Covers custom G+F, G+F+F, and G+G touch assemblies and PMMA/PC/glass touch-key panels across the full 0.96" to 55" span.
Full Optical Bonding	**≤ 32" [VERIFIED]**	Full optical lamination (OCA/OCR) is bounded at ≤ 32"; projects above 32" utilize perimeter air-gap frame bonding or project-defined integration.
Plant, Cleanroom & Monthly Capacity	**Est. 2018 | ≈ 5,500 m² | Class 100 / 1,000 | ≈ 1.5M pcs/mo**	Company-stated overall plant scale; cleanroom process routing is confirmed per program, and PO-specific capacity allocation, MOQ, and delivery lead time are confirmed at order stage [PROJECT].

03 Integrated OEM Value Proposition & Supply Chain Architecture

- **Unified Review Baseline:** A robust OEM solution places the enclosure viewing window, display active area (LCD AA), touch active area (TP AA), FPC routing corridor, connector mating orientation, host pinout interface, controller firmware parameters, and cosmetic acceptance criteria onto one unified, controlled review baseline.
- **Clear Division of Responsibility:** Depending on contracted scope, DaMing covers touch sensor engineering, cover/FPC adaptation, optical/tape bonding, display module integration, export packaging coordination, and batch delivery. Unless explicitly contracted otherwise, the customer retains primary responsibility for final equipment definition, system-level regulatory compliance (EMC/Safety), host OS driver maintenance, and final end-product validation.
- **Transparent Manufacturing vs. Supply Chain Management:** Integrated delivery does not imply that every raw component is fabricated under one roof. Raw cover glass machining, ITO sensor sputtering/etching, raw FPC fabrication, and certain converted adhesive materials may be sourced from qualified external supply partners, while DaMing manages incoming quality control (IQC), precision bonding, functional tuning, and module integration in-house within its ≈ 5,500 m² facility and Class 100 / Class 1,000 cleanroom zones.

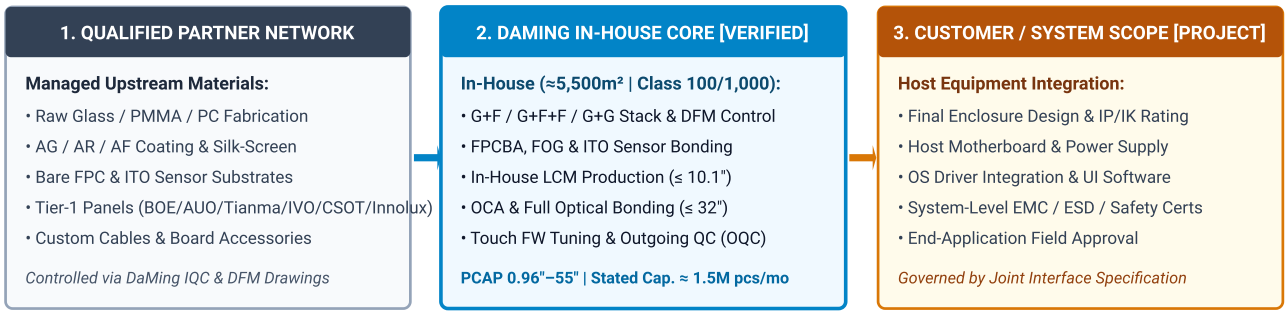


Figure 3.1: DaMing OEM Supply Chain Governance, Facility Scale and Engineering Responsibility Matrix

04 Requirements and DFM Review

- **Standard DFM Input Package:** Recommended engineering inputs include 2D/3D CAD drawings (STEP/DXF), enclosure window and overall outline dimensions, maximum thickness stack-up, coordinate datum scheme and tolerances, mounting method, FPC exit route, electrical interface pinout, operating/storage temperature range, chemical cleaning agents, glove/water behavior, and target service life.
- **Handling Incomplete Initial Inputs:** When customer drawings are incomplete at the early concept stage, a temporary requirement baseline can be constructed from equipment photos, physical bezel openings, target LCD model numbers, host board interfaces, and required touch functions. Every inferred dimension must be explicitly flagged as an assumption and formally confirmed before hard tooling or material procurement.
- **Controlled Review Output:** The DFM output is a revision-controlled engineering risk register documenting open items, assigned engineering owners, and required closure evidence. Verbal or instant-message agreements never replace a controlled engineering drawing.

DFM Input Category	Preferred Engineering Input	Fallback Baseline & Engineering Risk if Omitted
Mechanical Envelope	3D STEP of front housing + 2D tolerance drawing with shared X/Y/Z datum references.	Temporary outline sized from LCD outer frame; carries high risk of bezel interference or FPC pinching if unverified.
Optical & Display	Target LCM datasheet, brightness target (cd/m²), viewing angle cone, and bonding preference.	Candidate panel proposed from project pool; pinout, backlight drive voltage, and timing must be locked before FPC layout.
Touch & Environment	Cover thickness, glove material/thickness, water spray/droplet condition, operating temperature.	Standard indoor bare-finger tuning assumed; subsequent addition of thick gloves or water rejection may require sensor/IC redesign.

> **Project Gate 01 (DFM Freeze): Move forward to tooling and sample build only after critical inputs, open items, ownership, and validation criteria are formally recorded.**

05 Cover Lens and Front-Panel Design

- `[VERIFIED]` **Substrate Options:** Soda-lime glass, aluminosilicate glass, PMMA (acrylic), or PC (polycarbonate) can be selected according to optical clarity, impact resistance, scratch hardness, thickness limit, weight, CNC fabrication complexity, and chemical environment. Silk-screen printing, dead-front translucent windows, capacitive key icons, edge chamfering (2.5D/C-cut), and surface treatments must be clearly specified on the drawing.
- `[DESIGN RULE]` **Ink Step & Structural Geometry:** Viewing window edges, multi-layer silk-screen ink steps, decorative logo thickness, and adhesive bonding boundaries directly impact OCA bubble control, internal stress concentration, and visual appearance. Critical cover dimensions must share the equipment datum scheme.

- [PROJECT] **Surface Treatments & Impact Ratings:** Chemical strengthening depth (DOL/CS), Anti-Glare (AG), Anti-Reflective (AR), and Anti-Fingerprint (AF) coatings, ball-drop impact ratings, and optical transmittance targets are project-specific and require material specifications, supplier test evidence, and physical sample validation.

Design Parameter	Substrate / Treatment Option	Typical Reference Baseline [DESIGN RULE]	Engineering Design Consideration
Cover Thickness by Diagonal Size	Chemically Strengthened Glass	0.96"–7.0": 0.7 / 1.1 mm 8.0"–15.6": 1.8 / 2.0 / 3.0 mm 18.5"–55.0": 3.0 / 4.0 / 6.0 mm	Covers ≥ 3.0 mm require high-SNR touch controller tuning and optimized TX/RX sensor pitch.
Plastic Cover Options	PMMA or Polycarbonate (PC)	Thickness: 1.0 – 3.0 mm Surface Hardness: 3H–6H (Hard-coated)	Used in food/medical shatter-free zones; lower dielectric constant ($\varepsilon_r \approx$ 2.9–3.2) reduces touch coupling vs. glass.
Surface Treatments	AG (Etched / Coated) AR (Vacuum / Dip) AF (Fluoropolymer)	AG Gloss (60°): 60 – 110 GU AR Transmittance: ≥ 92% – 95% AF Water Contact Angle: ≥ 105°–110°	Etched AG offers permanent outdoor durability; AF coating wears over time depending on abrasion and cleaning agents.
Silk-Screen Border (BM Ink Step)	Ceramic Ink (High-Temp) or Organic UV/IR Ink	Organic Ink Thickness: 8 – 20 µm Ceramic Ink Thickness: 15 – 35 µm	OCA thickness must exceed roughly 5×–7× the ink step height (or use OCR) to prevent perimeter delay bubbles.

06 PCAP Sensor and Touch Control

- **Co-Designed Sensor & Controller System:** PCAP performance across our **0.96"–55"** touch capability span is a system balance between screen size, cover lens thickness, narrow bezel routing width, LCD VCOM/inversion noise, system grounding, glove thickness, water droplet/mist conditions, and multi-touch linearity. Sensor diamond/mesh pattern, trace impedance, and controller firmware configuration operate as one interdependent system across **G+F, G+F+F, and G+G** structures.
- **Strict Version Control:** Touch controller IC model, firmware hexadecimal revision, X/Y coordinate origin and orientation, TX/RX channel mapping, USB/I²C/RS232 interface protocol, and USB VID/PID identifiers must be locked under version control. Any change to the underlying LCD panel, cover lens material/thickness, host motherboard, or interconnect cable requires renewed tuning and noise evaluation.
- [PROJECT] **Validated Touch Behavior:** Supported touch-point count (single-point/gesture to 10+ multi-touch points), maximum glove thickness, wet-surface tracking vs. palm/water rejection, conducted/radiated immunity levels, and host operating-system compatibility are project-confirmed characteristics verified on actual hardware—never universal blanket claims.

Sensor Architecture	Layer Stack Structure	Key Engineering Advantages	Constraints & Typical OEM Fit [DESIGN RULE]
G+G (Glass + Glass)	Cover Lens + OCA + Dual-Side / Single-Side ITO Glass Sensor	High optical transmission (~86%–89%), superior surface rigidity, robust thermal/humidity stability, and low trace sheet resistance.	Slightly thicker stack; industry standard for industrial HMI, medical, outdoor, and rugged terminals across mid-to-large diagonals (up to 55").
G+F+F (Glass + Film + Film)	Cover Lens + OCA + ITO Film X + OCA + ITO Film Y	Thin profile, lighter weight, supports ultra-narrow borders, multi-touch linearity, and resistance to internal sensor cracking under housing flex.	Slightly lower transmittance (~82%–85%); widely used for compact portable terminals, smart appliances, and mid-sized industrial panels.
G+F (Glass + Single Film)	Cover Lens (Glass/PMMA/PC) + OCA + Single-Layer ITO Film Sensor	Ultra-thin stack-up, simplified optical lamination (single OCA layer), high optical clarity, and cost-effective sensor tooling.	Ideal for small-format displays (e.g., 0.96"–5.0" self-capacitance / single-touch / gesture) and custom capacitive touch-key panels.

07 FPC, Connector and Interface

- **Mechanical Routing & Stiffeners:** Define the FPC outline, PI/FR4/stainless-steel stiffener geometry, dynamic or static bend zone, minimum bend radius, gold-finger contact plating, mating connector part number, insertion orientation (top/bottom contact), and operator assembly sequence. Dynamic hinge flexing and one-time static service loop installation require completely different copper and coverlay design rules.
- **Pinout & Signal Integrity:** Pin definitions must match both host board schematics and adapter cable drawings 100%, including supply voltage (VDD 3.3V/5.0V), logic I/O voltage level (1.8V/3.3V), active-high/low Reset (RST), Interrupt (INT/IRQ), I²C pull-up resistors, USB D+/D− differential impedance (90 Ω ± 10%), EMI shielding layer, and chassis/signal ground separation.
- **Pre-Approval Mechanical Checks:** Before formal sample sign-off, complete physical connector retention fit, pin-1 polarity alignment, ZIF actuator locking clearance, pull/peel strength, and full equipment enclosure assembly verification.

FPC Design Feature	Engineering Baseline [DESIGN RULE]	Failure Mode Prevented
Minimum Static Bend Radius	Single-sided FPC: R ≥ 3× to 5× FPC thickness Double-sided FPC: R ≥ 6× to 10× FPC thickness	Prevents copper trace micro-cracking and open circuits during manual assembly folding into tight bezels.
Bonding Exit Tear-Stop & Keep-Out	Leave ≥ 1.5 – 2.0 mm unbent straight exit clearance beyond FOG/sensor bonding edge; apply silicone strain-relief glue.	Prevents ACF conductive particle delamination at the glass/FPC bonding edge (FOG peel stress).
Stiffener Overlap Design	Stagger PI stiffener edge and coverlay opening by ≥ 0.5 mm; match total gold-finger thickness to ZIF spec (usually 0.30 ± 0.03 mm).	Eliminates stress concentration line at stiffener boundary and prevents loose/intermittent ZIF contact.

08 Display Module and Optical Matching

- **Core Display Selection Criteria:** Display evaluation must confirm active area (AA) dimensions, outer mechanical frame outline, native resolution, video interface (RGB, LVDS, MIPI-DSI, eDP, SPI/MCU), timing parameters, luminance (cd/m²), viewing direction (6/12 o'clock or IPS full-view), LED backlight voltage/current topology, operating/storage temperature limits, LED half-brightness lifetime (L50), and supply chain longevity status.
- `[VERIFIED]` / `[PROJECT]` **In-House LCM Production (≤ 10.1") vs. Project / Tier-1 / Consigned Integration:** DaMing's **in-house LCM production capability covers ≤ 10.1"** (supporting custom FPC pinouts, FOG bonding, and backlight adaptation). For larger display sizes (**> 10.1"**) or specialized panel specifications, projects proceed via authorized sourcing of factory-original modules from Tier-1 panel makers (including **AUO, BOE, Tianma, Innolux, IVO, and CSOT**) or customer-consigned LCMs. Any panel substitution requires a comprehensive review of mechanical outline, FPC position, electrical timing, optical performance, and long-term availability.
- `[PROJECT]` **High-Brightness & Harsh-Environment Adaptation:** For semi-outdoor, full-outdoor, and harsh industrial environments, DaMing can engineer customized high-brightness backlight solutions and optical enhancements based on original modules or open-cell configurations to achieve sunlight readability and wide-temperature stability. Final luminance, color gamut, contrast ratio, and longevity belong to the confirmed display configuration and are claimed only with specifications and validation evidence.

> **Project Gate 02 (Design Freeze): Move forward only after LCD model, optical stack, FPC pinout, open items, ownership, and validation criteria are locked.**

09 Bonding and Optical Stack

- **Lamination Architecture & Size Envelope:** Cover-to-touch, touch-to-display, and full optical bonding structures are evaluated based on application constraints. OCA (Optically Clear Adhesive film), OCR/LOCA (Liquid Optically Clear Resin), or perimeter frame tape bonding (Air-Gap) is selected according to panel size, LCD bezel step topology, thickness tolerance, optical readability target, rework strategy, and thermal/humidity environment.
- `[VERIFIED]` **In-House Bonding Processes, Cleanroom Environment & ≤ 32" Full Bonding Boundary:** DaMing's verified in-house capabilities include **FPCBA bonding, ITO-sensor-related bonding, OCA lamination, cover lens plus FOG bonding, and LCD full optical bonding** executed within **Class 100 and Class 1,000 cleanroom** environments (specific cleanroom class and process recipe confirmed per program). While custom PCAP touch panels span **0.96"–55"**, **in-house full optical bonding (touch-to-display zero air-gap lamination) is bounded at ≤ 32"**; projects above 32" use perimeter air-gap bonding or project-confirmed integration.
- **Optical & Reliability Validation:** Bonding validation systematically examines visual bubbles, foreign particles/fibers, pressure mura (white/yellow spots), Newton rings (in air-gap stacks), perimeter adhesive overflow, polarizer warpage stress, total luminous transmission, and post-thermal-cycling delamination.

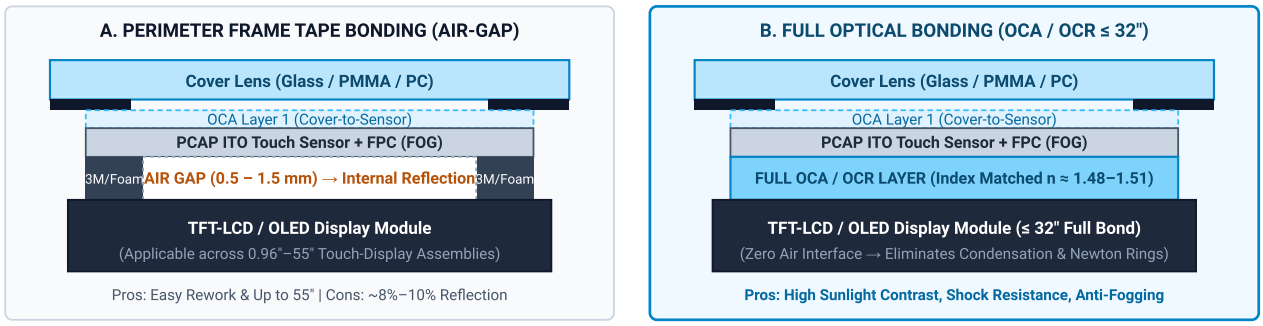


Figure 9.1: Optical Stack-Up Comparison — Perimeter Air-Gap Bonding vs. Full Optical OCA/OCR Lamination (≤ 32")

Bonding Method	Internal Reflection & Contrast	Mechanical & Environmental Impact	Size Envelope & Process Fit `[DESIGN RULE]`
Air-Gap Frame Tape (VHB / PE Foam)	Two internal air-surface boundaries reflect ~8%–10% ambient light; reduces outdoor contrast.	Susceptible to internal fogging in humid thermal swings; cover flexes over air cavity under load.	Supports up to 55" assemblies; high reworkability (LCD easily salvaged); cost-effective for indoor HMI.
Full OCA Bonding (Dry Adhesive Film)	Refractive index matched (n ≈ 1.48); reduces internal reflection to < 1%, boosting effective contrast.	Eliminates condensation cavity; acts as shock-absorbing laminate increasing impact resistance.	**In-house capability ≤ 32"** `[VERIFIED]`; executed in Class 100 / 1,000 cleanroom with vacuum lamination & autoclave.
Full OCR / LOCA (Liquid UV/Heat Resin)	Identical optical clarity and sunlight readability benefits as OCA full bonding.	Liquid flow fills uneven metal LCD bezels, thick ink steps, and deep surface topography with low stress.	**Bounded at ≤ 32"**; ideal for rugged/outdoor panels with raised metal LCD frames or thick cover glass (confirm per program).

10 Mechanical Integration and Tolerance

- **Unified Coordinate Datum Scheme:** The customer equipment bezel window, cover lens outer contour, silk-screen viewing window (VA), display active area (LCD AA), touch sensor active area (TP AA), mounting foam/tape gasket, housing support ledges, and z-axis depth clearance must all reference a single shared coordinate datum (typically the center of the LCD Active Area).
- **Worst-Case Tolerance Analysis:** Performing worst-case stack-up analysis early prevents visible black-matrix encroachment into the LCD AA, weak edge-touch linearity near metal bezels, pinched FPC service loops, or cantilevered cover glass edges lacking mechanical support. Assembly fixtures and operator drop-in sequences also belong in the DFM review.
- `[PROJECT]` **System-Level Ingress & Impact Boundaries:** Final waterproof/dustproof ingress ratings (e.g., IP65/IP67) and mechanical impact/drop/vibration ratings (e.g., IK07/IK08) depend on the complete customer enclosure design, gasket compression, and mounting structure. A touch-display sub-assembly alone cannot establish or certify the final equipment rating.

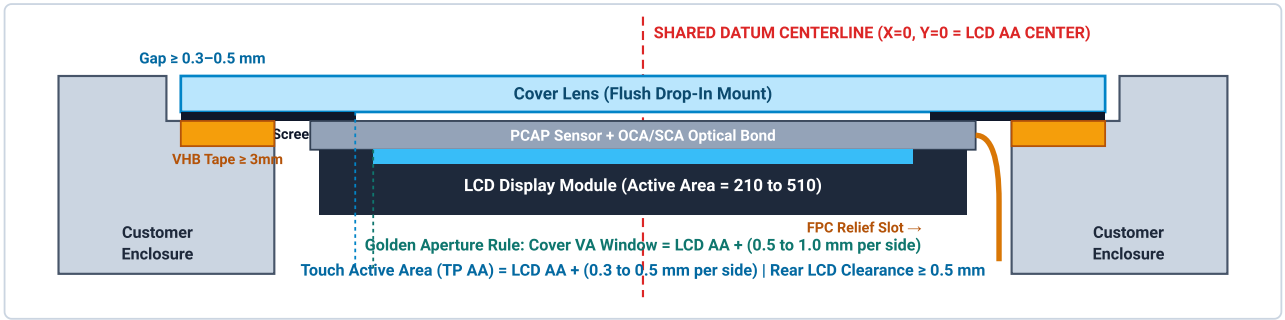


Figure 10.1: Shared Coordinate Datum Scheme and Golden Aperture Alignment Rules [DESIGN RULE]

11 Electrical, EMC and Host Software

- **Coordinated Power & Interface Architecture:** Host board selection, rail power budget, display video interface, LED backlight boost driver, touch interface, chassis grounding, cable shielding, and wire harness length must be engineered together. High-amplitude LCD VCOM switching noise and poor AC/DC power supply common-mode ripple directly couple into the capacitive sensor array and degrade touch accuracy.
- **System-Level EMC Troubleshooting:** Effective EMC/EMI troubleshooting (such as EN 61000-4-3 Radiated Immunity or EN 61000-4-6 Conducted Immunity) requires the actual target system: the customer's AC/DC power adapter, enclosure grounding path, internal wire harnesses, LCD module, and host motherboard. Touch controller firmware tuning (such as frequency hopping) addresses only part of the system equation.
- `[PROJECT]` **Software & Compliance Ownership:** OS driver integration (Windows, Linux, Android, QNX, RTOS), kernel maintenance, user application software, and final equipment regulatory certification responsibility must be explicitly defined. Formal EMC or safety compliance conclusions require accredited laboratory testing on the complete customer equipment.

Interference / Noise Source	Symptom on PCAP Touch Panel	Hardware & Firmware Mitigation Strategy `[DESIGN RULE]`
LCD VCOM / Inversion Switching Noise	Ghost touches, jittering cursor, or dead zones when specific pixel patterns are displayed.	Increase air-gap or OCA thickness; add rear ITO shielding layer on sensor; enable multi-frequency hopping and high-voltage TX drive in touch IC.
Power Adapter Common-Mode Ripple	Touch works on battery/bench supply but loses sensitivity or false-triggers on wall AC adapter.	Ensure low-impedance chassis earth connection; add common-mode choke on power/USB lines; stabilize 3.3V/5V touch rail ripple to < 50 mV_{pp}.
ESD Strike around Bezel Edge (IEC 61000-4-2)	Touch controller lock-up, USB enumeration drop, or permanent IC pin damage.	Increase cover glass overhang beyond sensor traces; place low-capacitance TVS diodes on USB/I²C lines; implement host watchdog auto-reset on RST pin.

12 Prototype, Sample and Validation

- **Staged Sample Maturity (EVT / DVT / PVT):** A disciplined OEM program separates Engineering Validation Samples (prototype fit/function check), Design Validation Samples (frozen tooling/BOM for environmental and EMC qualification), and Production Validation Samples (pilot run verifying fixture capability and Golden Sample sign-off). Each stage locks drawing revisions, BOM, firmware checksums, sample serial numbers, test conditions, and any approved concessions.
- **Baseline vs. Application-Specific Checks:** Baseline outgoing sample checks cover cosmetic appearance, critical mechanical dimensions, touch linearity/accuracy, coordinate orientation, edge-touch sensitivity, display illumination, interface stability, trial housing assembly, and baseline thermal operation. Extended life and destructive tests follow the agreed project risk plan.
- `[PROJECT]` **Boundary of Sample Approval:** Customer approval of prototype samples demonstrates only that the tested hardware/firmware configuration met requirements under the stated evaluation conditions. It does not automatically certify future unauthorized BOM changes, unverified extreme environments, or final host equipment regulatory compliance.

> **Project Gate 03 (Sample Sign-Off): Move forward to mass production tooling/material release only after critical validation evidence and Golden Samples are signed off.**

13 Reliability and Quality Planning

- **Application-Driven Reliability Plans:** Reliability validation matrices should reflect real end-use risks and may include high/low temperature storage and operation, damp-heat humidity cycling, thermal shock, contact/air ESD, sinusoidal/random vibration, packaged/bare drop, UV solar weathering, chemical solvent wipe resistance, touch-key actuation life, or dynamic FPC flex testing.
- **Explicit Test Protocol Definition:** Before testing begins, both parties must define sample quantity, temperature/humidity profiles, dwell duration, functional pass/fail thresholds, optical shift limits, failure analysis (FA) workflow, and retest rules. Unagreed test conditions must never be assumed as fixed standard capability.
- **Production Quality & Cosmetic Zoning:** Production quality control (IQC, IPQC, OQC) governs incoming materials, critical-to-quality (CTQ) dimensions, cosmetic inspection criteria, 100% functional touch/display testing, lot traceability, nonconformance (NCR/8D) handling, and change control. Quality management system or product certification claims require valid certificates and applicable scope.

Inspection Zone	Zone Definition	Reference Inspection Condition & Focus `[DESIGN RULE]`
Zone A (Central Active Area)	Primary viewing and touch active area (LCD AA / Cover VA interior).	Strictest control on pinholes, lint/fibers, micro-bubbles, linear scratches, and LCD pixel defects. Viewed at 30–50 cm under 500–1000 Lux fluorescent/LED light at 45°/90° angles.
Zone B (Perimeter Bezel)	Silk-screen border, backlit icon windows, and visible outer glass edge.	Controlled for ink pinholes, light leakage, step unevenness, edge chipping, and colour consistency against approved master limit samples.
Zone C (Non-Visible Area)	Rear chassis surface, internal adhesive zone, and concealed FPC tail.	Cosmetic blemishes permitted if they do not impact structural integrity, glass strength, adhesive seal, or electrical reliability.

14 Production Introduction, Capacity Baseline and Change Control

- **Pre-Production Readiness Checklist:** Before releasing mass production (MP), both teams must formally close 2D/3D engineering drawings, master BOMs, controller firmware binaries, incoming/outgoing inspection specifications (SIP), packaging drop specs, barcode/label formats, signed physical Golden Samples, and all open DFM action items. Critical outsourced components (cover glass, ITO sensors, LCD cells, FPCs) are locked into incoming quality and supplier change controls.
- **Engineering Change Notification (ECN / PCN):** Any proposed change to raw materials, sub-tier suppliers, bonding adhesives, manufacturing equipment, touch firmware, or mechanical dimensions can affect optical appearance, touch SNR, display timing, long-term reliability, or customer EMC compliance, and must trigger agreed PCN notification and customer revalidation before implementation.
- `[VERIFIED]` / `[PROJECT]` **Company-Stated Capacity vs. PO-Confirmed Allocation:** DaMing's company-stated overall manufacturing capacity is approximately **1.5 million pieces/month** across its **≈ 5,500 m²** plant and **Class 100 / Class 1,000 cleanroom** lines. However, specific production line allocation, mass production yield assumptions, Minimum Order Quantity (MOQ), standard delivery lead time, and safety stock arrangements for any individual project are commercial parameters confirmed at the quotation and Purchase Order (PO) stage; company-stated overall capacity does not constitute a universal capacity SLA or delivery guarantee for arbitrary orders.

15 Packaging, Logistics and Lifecycle

- **Engineered Protective Packaging:** Export packaging is engineered to protect fragile glass edges, protruding FPC tails, ZIF connectors, and optically bonded surfaces against mechanical shock, humidity ingress, electrostatic discharge (ESD), transit vibration, pallet stacking compression, and international air/sea freight handling. Outer carton and inner tray labels trace customer part number, engineering revision, manufacturing lot code, date, and quantity.
- **Component Obsolescence & Lifecycle Management:** Active lifecycle monitoring tracks End-of-Life (EOL) notices or process changes across LCD panels, touch controller ICs, ZIF/board connectors, optical adhesives, and outsourced processes. Commercial and engineering responsibilities for Last-Time-Buy (LTB) buffers and form-fit-function (FFF) redesigns of customer-nominated vs. DaMing-integrated materials must be explicitly contracted.
- `[PROJECT]` **Multi-Year Program Realities:** Overseas industrial and medical design-in programs routinely involve multi-stage validation rounds and multi-year supply expectations, but actual development schedules and continuous supply duration depend on project specifics and upstream LCD/semiconductor supply-chain conditions rather than fixed universal commitments.

16 Interactive Project Start RFQ Checklist and Conclusion

To accelerate DFM evaluation and receive an accurate engineering proposal and quotation from **DaMing Touch & Display**, hardware engineers and technical buyers can check or fill in the baseline requirements below and attach this sheet to their initial RFQ package:

Engineering Category	Project Target Selection & Technical Input (Check ☐ or Specify)
1. Application & Environment	**Sector:** ☐ Industrial HMI ☐ Medical Device ☐ Commercial Terminal ☐ Smart Home/Appliance ☐ Outdoor/Marine **Installation:** ☐ Indoor Controlled ☐ Semi-Outdoor (High Ambient Light) ☐ Full Outdoor (Direct Sunlight / UV) **Operating Temp:** ☐ 0°C to +50°C ☐ −20°C to +70°C ☐ −30°C to +80°C ☐ Custom: [_____ °C]
2. Supply Scope Required	☐ Custom PCAP Touch Panel Only (0.96"–55") ☐ PMMA/PC/Glass Touch-Key Panel ☐ Decorated Cover Lens Only ☐ Integrated Touch + Display Assembly ☐ Value-Add Accessories (Driver Board / Android Board / Cables)
3. Cover Lens & Mechanics	**Diagonal Size:** [_____ inches] **Outer Outline (W × H × T):** [_____ × _____ × _____ mm] **Material:** ☐ Soda-Lime Glass ☐ Aluminosilicate Glass ☐ PMMA ☐ Polycarbonate (PC) **Surface Treatment:** ☐ Clear (Untreated) ☐ AG (Anti-Glare) ☐ AR (Anti-Reflective) ☐ AF (Anti-Fingerprint) **CAD Drawings Attached:** ☐ 2D PDF/DXF ☐ 3D STEP Enclosure ☐ Concept Photos / Need DaMing Proposal
4. PCAP Touch & Interface	**Sensor Structure:** ☐ G+G (Glass-Glass) ☐ G+F+F (Glass-Film-Film) ☐ G+F (Small Size / Self-Cap) ☐ Recommend by DaMing **Operation Mode:** ☐ Bare Finger Only ☐ Medical Latex Gloves ☐ Thick Gloves ([___ mm]) ☐ Water Droplet / Mist **Touch Interface:** ☐ I²C ☐ USB ☐ RS232/UART **Host OS:** ☐ Linux ☐ Android ☐ Windows ☐ MCU/RTOS
5. Display & Bonding Stack	**Display Pathway:** ☐ In-House LCM (≤ 10.1") ☐ Tier-1 Original (> 10.1" or spec: BOE/AUO/Tianma/Innolux/IVO/CSOT) ☐ High-Bright Outdoor Adaptation ☐ Customer-Consigned LCM **Resolution / Luminance:** [_____ × _____ px] / [_____ cd/m²] **Interface:** ☐ LVDS ☐ MIPI ☐ RGB ☐ eDP ☐ SPI/MCU **Bonding Method:** ☐ Perimeter Frame Tape (Air-Gap, up to 55") ☐ Full OCA Optical Bonding (≤ 32") ☐ Full OCR/LOCA Bonding (≤ 32")
6. Schedule & Commercial	**Prototype Qty & Target Date:** [____ pcs by YYYY-MM] **Estimated Annual Volume (EAU):** [_____ pcs/yr] **Destination / Delivery Incoterms:** [_____]

Conclusion: DaMing's engineering objective is to convert custom PCAP touch, cover lens, display matching, and optical bonding requirements into a manufacturable, verifiable, and traceable OEM solution. Closing high-risk mechanical, optical, and electrical interfaces through a controlled requirement sheet and shared interface drawing before tooling and sample build is the most reliable path to on-time mass production. Final project scope is governed strictly by the approved quotation, controlled drawings, specifications, Golden Samples, and commercial contract.

> **Project Gate 04 (Program Launch): Move forward only after critical inputs, open items, ownership, and validation evidence are formally recorded.**