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INSIGHT

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Greater China Technology Semiconductors

Time to revisit CPO and its testing/packaging supply chain

With the recent correction of Taiwan's CPO supply chain, we think expectations have been reset. It's time to revisit the stocks. Reiterate OW on ASE, upgrade WIN Semi to EW, downgrade FOCI to EW.

PIC (photonic IC) and testing are major gating factors for co-packaged optics: During SEMICON Taiwan, several global semiconductors CEOs confirmed that CPO adoption is a matter of time. In our recent AI supply chain tracker, we also indicated that Rubin Ultra NVL576 will use CPO for scale-up connect. However, recently some investors have debated whether PIC supply from TSMC may decrease to 35mn units (vs. our previous forecast of 60mn units), which caused a correction of Taiwan's CPO supply chain over the past month. We think that expectations have been reset and it's time to revisit the stocks.

Testing is still the gating factor for CPO to scale: Our recent supply chain checks suggest that although TSMC's PIC production is still the bottleneck, total OE (optical engine) production could still reach c. 60mn in 2026. By assuming a 95% yield rate for TSMC EIC/PIC hybrid bond and 30% yield rate in downstream assembly, the available OE shipments could still reach 17-18mn, which we think is enough to cover 5k NVL576 equivalent of scale-up switches and 200-250k of spectrum scale-out. The open question for 2027 is how fast it can scale. We think testing is the step that sets that pace – the whole CPO testing process is still not finalized. Within our Greater China Semis coverage, we believe TSMC, ASE, Hon Precision, MPI, and AllRing will continue to benefit from this secular trend – we suggest building positions on any pullbacks. WIN Semi and KYEC could also benefit from optical demand proliferation and longer testing on AI semis. We therefore upgrade WIN Semi to EW.

FAU is becoming crowded; downgrade FOCI to EW: Over the past 12 months the supplier base of FAU (Fiber Array Units) has changed. We count at least 10 companies with CPO FAU products shipping, sampling, or in pilot production. Three of them (Corning, Coherent, and TFC) should have larger roles than FOCI in NVIDIA's CPO programs in Rubin NVL576 generation. We therefore see FOCI's FAU market share as more challenging than a year ago. If FOCI can show design wins and share on Optical IO platforms as adoption widens, we would revisit our rating.

What about opportunities in China? NPO should be mainstream for China's AI computing systems: We expect near-packaged optics (NPO) to become the main optical interconnect in China's AI computing systems from 2027, ahead of CPO. For details, please see Could NPO be the solution rather than CPO?

With this report, Lucas Wang assumes coverage of Allring, FOCI, MPI, Hon Precision, and King Yuan Electronics.

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GREATER CHINA TECHNOLOGY SEMICONDUCTORS

Asia Pacific

Industry View **Attractive**

Exhibit 1 : Rating/Price Target Changes

What's changed		Rating	Price Target
Allring	6187.TWO	Unchanged at OW	From NT$1580 to NT$2000
WIN Semi	3105.TWO	From UW to EW	From NT$300 to NT$600
KYEC	2449.TW	Unchanged at OW	From NT$338 to NT$348
ASE	3711.TW	Unchanged at OW	From NT$628 to NT$858
FOCI	3363.TWO	From OW to EW	From NT$708 to NT$688

Source: Morgan Stanley Research estimates

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Asia – Testing/CPO Stocks: Order of Preference

Exhibit 2: Asia – Testing/CPO Stocks: Order of Preference

	Hon Precision 7769.TW	MPI 6223.TWO	Allring 6187.TWO	ASE 3711.TW	Chroma 2360.TW	Advatest 6857.T	TSMC 2330.TW	KYEC 2449.TW	Largan 3008.TW	WIN Semi 3105.TWO	FOCI 3363.TWO
Rating	Overweight	Overweight	Overweight	Overweight	Overweight	Overweight	Overweight	Overweight	Equal-Weight	Equal-weight	Equal-weight
Trading Currency	TWD	TWD	TWD	TWD	TWD	JPY	TWD	TWD	TWD	TWD	TWD
Price Target	**10,008.0**	**8,000.0**	**2,000.0**	**858.0**	**2,800.0**	**45,000.0**	**3,088.0**	**348.0**	**7,100.0**	**600.0**	**688.0**
Current Price	5,925.0	5,575.0	1,525.0	744.0	2,330.0	40,930.0	2,550.0	304.5	6,660.0	581.0	667.0
Upside/(Downside) (%)	69%	43%	31%	15%	20%	10%	21%	14%	7%	3%	3%
Market Cap (in USD mm)	30,135.7	17,615.0	4,599.7	105,402.2	31,106.1	187,585.6	2,075,671.0	11,755.0	28,046.8	7,730.4	2,379.6
Avg Daily Traded Vol (in USD mm)	170.5	162.8	67.7	327.0	182.5	1,710.8	2,304.2	246.7	177.6	265.0	67.4
Street View: Ratings											
Buy/Overweight	100%	92%	100%	100%	100%	83%	95%	93%	70%	64%	100%
Hold/Equal-weight	0%	8%	0%	0%	0%	17%	5%	7%	15%	7%	0%
Sell/Underweight	0%	0%	0%	0%	0%	0%	0%	0%	15%	29%	0%
Bull Case Value	16,000.0	11,000.0	2,780.0	1,000.0	3,900.0	61,000.0	3,720.0	428.0	11,142.8	900.0	895.0
Upside (%)	170%	97%	82%	34%	67%	49%	46%	41%	67%	55%	34%
Bear Case Value	5,000.0	5,000.0	810.0	500.0	1,100.0	23,000.0	1,700.0	220.0	3,649.2	300.0	320.0
Downside (%)	-16%	-10%	-47%	-33%	-53%	-44%	-33%	-28%	-45%	-48%	-52%
Risk/Reward Skew	10.9	9.4	1.8	1.0	1.3	1.1	1.4	1.5	1.5	1.1	0.7
Morgan Stanley Estimates											
FY26e	TWD	TWD	TWD	TWD	TWD	JPY	TWD	TWD	TWD	TWD	TWD
Sales	54,983	21,126	10,055	847,748	55,154	1,848,000	5,589,451	47,683	66,920	21,499	2,100
EBITDA	28,578	7,241	3,340	190,688	22,684	940,300	4,201,496	27,207	33,813	6,082	(34)
EBIT	28,510	7,241	3,281	102,211	21,844	909,000	3,384,759	13,675	25,313	2,862	(194)
EPS	129.19	64.33	30.89	18.42	43.97	971.45	115.32	9.06	184.85	8.63	(0.34)
FY27e											
Sales	93,963	46,004	18,000	1,143,902	76,117	2,945,600	7,471,986	67,303	74,757	28,255	6,791
EBITDA	49,985	17,492	5,371	330,239	32,742	1,593,500	5,560,587	43,467	37,386	9,614	1,605
EBIT	49,917	17,492	5,312	195,615	31,967	1,558,000	4,577,529	21,516	28,086	5,427	1,363
EPS	222.56	150.14	48.14	32.92	62.77	1,591.42	152.74	13.66	204.18	11.29	10.18
FY26 MSe vs. Consensus Mean											
Sales	-1.6%	-1.7%	10.1%	1.0%	0.8%	5.7%	2.8%	-0.6%	1.0%	2.9%	-10.4%
EBITDA	1.2%	-12.9%	9.8%	6.5%	-1.6%	4.9%	4.4%	9.3%	1.9%	-5.2%	-125.7%
EBIT	1.5%	-2.7%	11.3%	3.4%	-1.7%	-23.3%	6.0%	1.3%	-0.8%	-6.3%	404.2%
EPS	0.3%	-1.1%	11.1%	-1.3%	-1.6%	6.0%	6.8%	1.3%	0.0%	22.3%	-266.7%
FY27 MSe vs. Consensus Mean											
Sales	1.2%	10.4%	30.7%	8.6%	-2.7%	31.6%	1.7%	-3.9%	1.9%	13.5%	-26.3%
EBITDA	1.8%	-3.0%	7.4%	21.5%	-7.7%	37.8%	2.6%	16.1%	0.6%	19.3%	-36.9%
EBIT	3.0%	10.6%	9.7%	22.8%	-6.7%	8.6%	6.2%	-4.2%	-2.9%	15.0%	-37.7%
EPS	1.5%	9.9%	12.7%	15.9%	-6.1%	36.0%	6.6%	-6.2%	0.1%	13.3%	-39.9%
Valuation Multiples at Last Close											
FY26e											
P/E	45.9x	86.7x	49.4x	40.4x	53.0x	42.1x	22.1x	33.6x	36.0x	67.3x	-1951.4x
EV/EBIT	32.6x	76.7x	43.1x	35.9x	44.9x	31.7x	18.8x	30.7x	30.0x	88.1x	-391.3x
EV/EBITDA	32.5x	76.7x	42.3x	19.3x	43.3x	30.6x	15.1x	15.5x	22.4x	41.5x	-2268.0x
EV/Sales	16.9x	26.3x	14.1x	4.3x	17.8x	15.6x	11.4x	8.8x	11.3x	11.7x	36.2x
FCF Yield	-0.6%	0.6%	1.4%	-3.9%	1.5%	2.1%	2.2%	-7.5%	1.5%	0.7%	-1.9%
FY27e											
P/E	26.6x	37.1x	31.7x	22.6x	37.1x	25.7x	16.7x	22.3x	32.6x	51.5x	65.5x
EV/EBIT	18.8x	31.4x	26.3x	19.4x	30.4x	17.9x	13.5x	19.8x	26.8x	46.5x	57.3x
EV/EBITDA	18.8x	31.4x	26.0x	11.5x	29.7x	17.5x	11.1x	9.8x	20.1x	26.3x	48.7x
EV/Sales	10.0x	12.0x	7.8x	3.3x	12.8x	9.5x	8.3x	6.3x	10.1x	8.9x	11.5x
FCF Yield	1.3%	1.7%	2.0%	-2.2%	2.3%	3.4%	3.4%	-0.2%	2.0%	1.3%	-2.5%

Source Company data FactSet, Morgan Stanley Research e – Morgan Stanley Research estimates Note: Current prices as of the market close on October 8, 2026 unless otherwise noted

Testing is still the gating factor for CPO to scale

Co-packaged optics (CPO) is now in production. NVIDIA's Quantum-X Photonics InfiniBand switch began shipping around early 2026 and was in customer production deployments by mid-2026. Spectrum-X Ethernet Photonics entered full production in August 2026. The open question for 2027 is how fast it can scale – and we think testing is the step that sets that pace.

Optical testing today is slow and largely manual, with no common standard, which also makes automation critical for CPO to scale. In current NVIDIA flows, optical testing coverage largely ends at the optical engine (Insertion 3), and the packaged device receives an electrical-only final test. Two insertions are being added: simultaneous optical-electrical final test (Insertion 4) and SLT (system level test). We believe Insertion 2 (wafer-level testing of bonded EIC-on-PIC wafers) will remain in the process – it's important to select KGOE (known good OE) as earlier as possible.

Hon Precision has the clearest dated exposure through its Insertion 4 handler, an all-new tool that carries a higher ASP than electrical-only final testing. MPI is the earliest local entrant at the optical engine stage (Insertion 3), and Insertion 2 is upside optionality if qualification succeeds. AllRing supplies assembly equipment: its fiber-array coupling tools sit between Insertions 2 and 3, and demand scales with optical engine count. ASE executes much of the back-end flow and buys the equipment; it benefits as test content moves from the wafer to the package.

The key debate is timing of scale-up CPO. Switch-only CPO volumes keep test tool counts modest. The step-change in test equipment demand comes when CPO moves into NVLink scale-up, which first appears in Rubin Ultra NVL576 (2H27) and reaches volume with Feynman (2028).

Co-packaged optics

In CPO, "insertion testing" typically refers to the defined test insertion points throughout the manufacturing flow, specifying where and how optical-related testing is conducted from wafer level through final system integration. The primary objective of these insertion tests is to identify the known-good optical engines (KGOE) prior to integration with SoC/ASIC. In practice, current CPO manufacturing flows typically include four to five test insertion stages. The associated measurements can be broadly grouped into three domains: photonic integrated circuit (PIC) signals, optical output signals from the optical engine, and system-level electrical and optical signals. However, as CPO technology remains at an early stage of development, TSMC and its OSAT partners are still in the process of defining and standardizing the full insertion-test flow, while concurrently qualifying suitable testing equipment and ecosystem partners.

Why testing is the gate

Testing a PIC means bringing a fiber to an on-chip coupler with sub-micron to few-micron tolerance. The cross-sectional area of a single-mode fiber core is hundreds of times that of a silicon waveguide, so small misalignments produce large jumps in insertion loss. Thermal

behavior adds a second layer: ring modulators shift resonance with temperature, and the buried oxide layer in SOI wafers conducts heat about 100 times worse than silicon. Electrical probe cards work at tens-of-microns precision; optical alignment is a different regime.

There is no unified test standard for PIC parameters such as insertion loss, polarization-dependent loss, responsiveness, and crosstalk. Connector designs also vary by customer, so this lack of connector standardization makes automation harder because test systems must handle many connector types.The result is that test throughput, test cost, and yield learning now determine how fast CPO capacity can grow, more so than the optical device technology itself.

Insertion framework – from Insertion 1 to Insertion 4 and SLT (Insertion 5)

Insertion 1 typically refers to PIC (Photonic IC) Wafer-Level Testing: The objective is to screen core photonic components such as modulators, photodiodes, and power monitors before downstream processing. Typical test items include optical power, insertion loss, dark current, and basic DC electrical/optical characteristics. This early screening step plays a critical role in removing defective dies upfront, thereby protecting yield and reducing losses in subsequent manufacturing stages.

Insertion 2 typically takes place after the COUPE/SoIC stage: This is when electronic IC (EIC) dies are bonded onto the PIC wafer, while testing is still conducted at the wafer level. This stage focuses on electro-optical (EO/OE) performance and the interaction between photonic and electronic components. Key measurements include modulation efficiency, receiver sensitivity, EO/OE conversion characteristics, and overall link performance. The objective is to verify that the integrated electrical and optical subsystems operate correctly and cohesively before proceeding to further assembly steps.

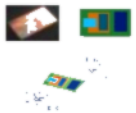
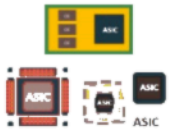
In insertion 2, COUPE stacks the EIC on top of the PIC, so a wafer-level tester must contact the EIC electrically on one side while aligning fiber to the PIC on the other. Optical coupling at this stage is sensitive to vibration, temperature, and wafer warpage, which should be the hardest process within CPO insertion testing, in our view.

Insertion 3 is performed after the optical engines are diced individually from the PIC wafers: It is typically conducted at the OSAT stage. Before co-packaging with the ASIC, each optical engine undergoes testing to qualify as a KGOE. This stage includes high-speed (at-speed) testing such as bit-error-rate (BER), eye-diagram, and jitter analysis, as well as assessments of power consumption, thermal behavior, and wavelength stability. This represents one of the most critical test insertion points, as it shifts defect detection earlier in the manufacturing flow and materially reduces downstream integration risk.

Insertion 4 occurs after the optical engine is co-packaged with the ASIC: At that point, a final test is performed on the fully packaged device using both electrical and optical interfaces. Typical test coverage includes electrical functionality, optical link integrity, transmit/receive channel verification, multi-channel consistency, and performance under thermal conditions. This stage closely resembles traditional ATE-based final testing, but with added optical complexity.

SLT is the final insertion: It evaluates the device under mission-mode, real-world operating conditions. SLT typically involves running realistic traffic patterns, conducting long-duration stress tests, monitoring error rates, and assessing thermal-electrical-optical interactions. The objective is to validate end-system performance, stability, and reliability under actual use conditions.

Exhibit 3: CPO Insertion Test Flow

Test Insertion	Insertion 1 (wafer-level)	Insertion 2 (wafer-level)	Insertion 3 (die-level)/3.5 (package-level)	Insertion 4 (module-level)		Insertion 5 (potential)
				Insertion 4O	Insertion 4E	
Test content	Electronic IC (EIC) & Photonic IC (PIC)	EIC die to PIC wafer (after SoIC)	Optical engine (die-to-die)	CPO package (ASIC+OE) Optical Testing	CPO package (ASIC+OE) Electrical Testing (2025-2026) Optical+Electrical Testing (starting 2027e)	CPO package (ASIC+OE) SLT?
Testing surface						
Key Product timeline	2025-2026 Scale-out CPO switch (Spectrum+Quantum) products 2027e onward: Scale-out CPO switch (Spectrum+Quantum) + Scale-up CPO switch products					
Testing details	El. & opt. DC, (power, loss, dark current etc.)	E/O, O/E, O/O, high speed, S-parameters	Full calibration/DC, high-speed functional, optical loopback, alternatively: S-parameters	Optical Light Transmission Testing, optical loopback	BER testing, signal testing	Full system functional validation
Testing service provider	Foundry (Wafer-level) TSMC	Foundry (Wafer-level) TSMC	OSAT (Die/chip level) SPIL (ASE Group)	OSAT (Die/package level) SPIL (ASE Group)	OSAT (Die/package level) SPIL (ASE Group)	OSAT (Die/package level) SPIL (ASE Group)
Equipment and Consumable Vendo	PIC ATE tester: 1) Advantest + TEL + Formfactor 2) Chroma (underqualification) EIC tester: 1) Teradyne + TEL EIC Probe card: FormFactor	Wafer level testing: 1)Ficontec +Formfactor +Teradyne 2) Advantest+ **MPI**	Die-to-die prober: 1. TEL 2. MPI Optical engine E/O tester+laser reliability test+ELS source test head: Chroma **Optical and Electrical Test Socket: Winway**	CPO switch tester: Chroma **Hypersocket: Winway**	ATE tester: 1) Advantest (under qualification) 2)Teradyne **FT Handler+ELS source test head+optical alignmnet stage : Hon Precision** **Hypersocket: Winway**	CPO SLT tester: Chroma (under qualification) **Coaxial socket/Hypersocket: Winway**

Source: Company data, Morgan Stanley Research (e) estimates

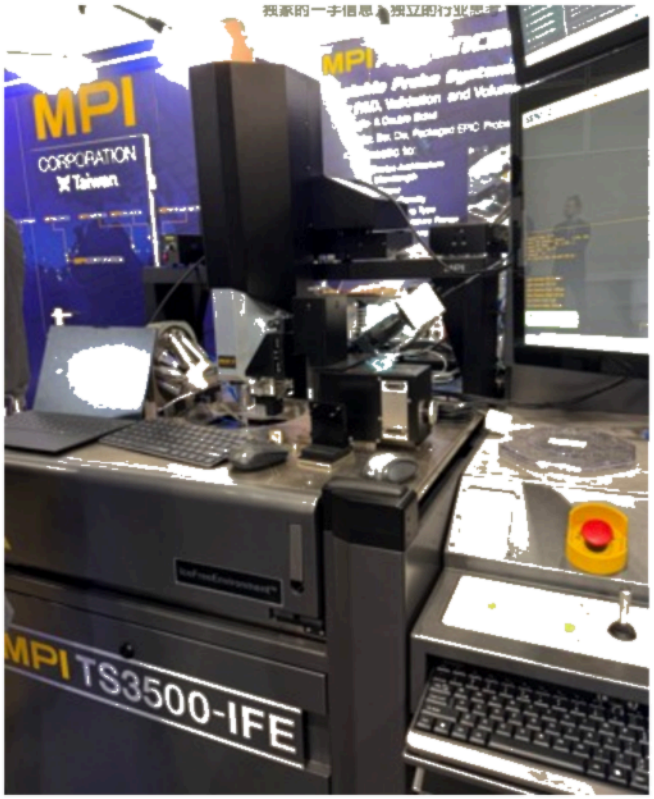
For MPI, we expect CPO testing to emerge as a key revenue growth driver over the coming years: Leveraging its prior experience in LED applications, MPI has the capability to internally develop optical modules for both PIC wafer-level and die-level testing, alongside electrical signal testing for EIC dies. At present, MPI is shipping wafer-level testing equipment for Insertion 2 by partnering with Advantest and die-to-die probers for Insertion 3. The company is also developing several additional CPO-related testing tools, as well as expanding its portfolio of probe cards for EIC applications.

Exhibit 4: MPI's wafer-level testing equipment for insertion 2



Source: MPI

Exhibit 5: Live demo of wafer-level testing equipment



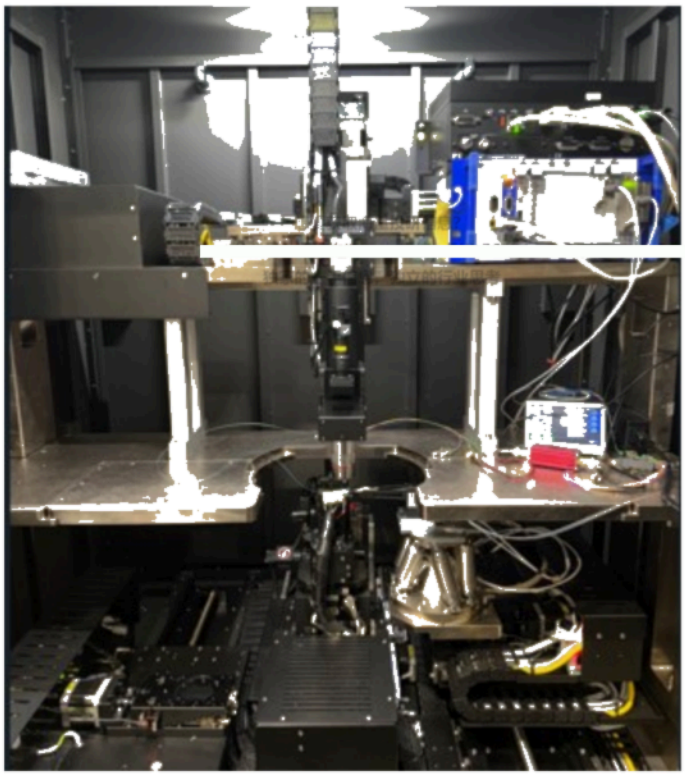
Source: MPI

Exhibit 6: MPI's equipment for insertion 3 (DT650)



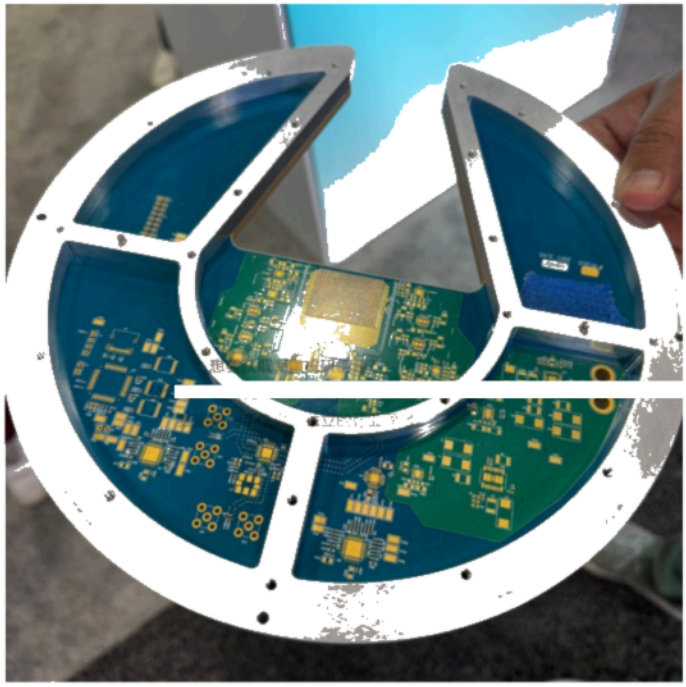
Source: MPI

Exhibit 7: Live demo of die-to-die testing equipment



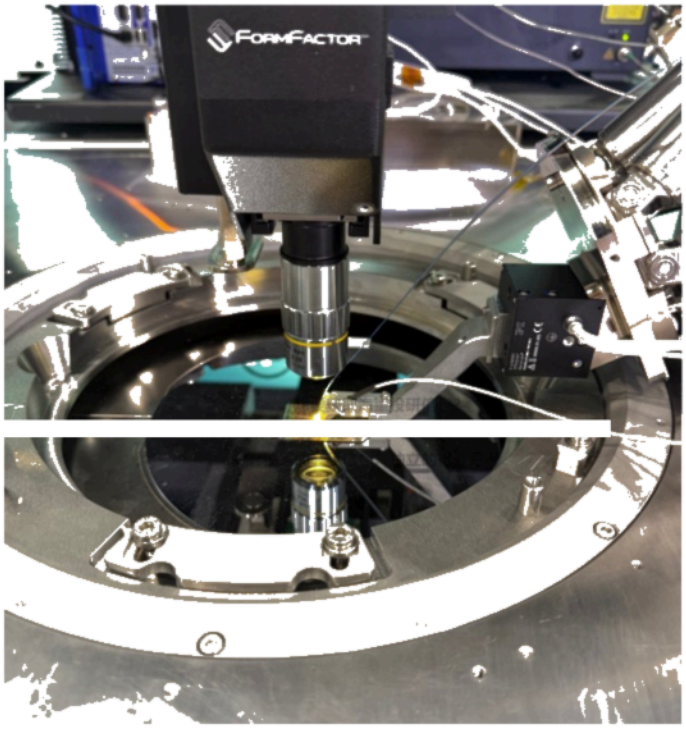
Source: MPI

Exhibit 8: Probe card for EIC die on PIC wafer for wafer-level testing for CPO



Source: FormFactor

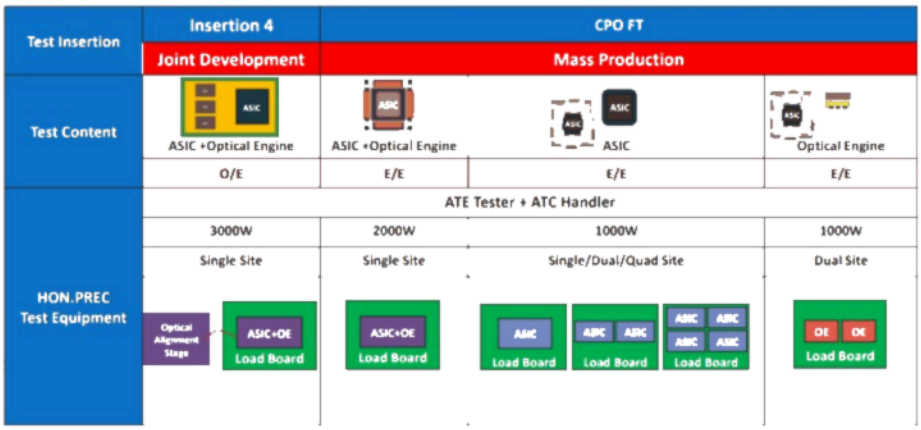
Exhibit 9: Wafer-level testing for optical engine



Source: FormFactor

For Hon Precision, we see CPO as an incremental demand opportunity: As Insertion 1 and Insertion 2 are both conducted at the wafer level, Hon Precision's primary exposure lies in Insertion 4, expected to commence from 2027, as well as in the electric testing performed on Spectrum and Quantum packages. Hon Precision supplies ATC handlers, which operate in conjunction with ATE (Automatic Test Equipment). The company started shipping ATC handlers for Spectrum and Quantum testing in 2025, and is currently planning to introduce its next-generation handlers for Insertion 4, with shipments expected to begin in 1H27 in preparation for CPO scale-up and mass production.

Exhibit 10: Hon Precision's solution for CPO



Source: Company data.

Allring's CPO products have penetrated the CPO supply chain of NVIDIA for FAU-optical engine coupling and FAU AOI equipment: Its coupling machine pairs a six-axis alignment stage with image recognition for automated FAU-to-chip coupling. This step creates the optical engine that Insertion 3 tests, so coupling yield and throughput directly affect Insertion 3 results. Our latest supply chain checks also suggest that AllRing may have also won the dispensing step after insertion 3, where the optical engine will be mounted onto the CPO package substrate. We expect it to account for 2%, 17%, and 22% of AllRing's total revenue in 2026, 2027, and 2028, respectively. Key focus will be the throughput per tool, which we believe will be the key focus for its customers and the advantage for Allring against its competitors like ADST and MRSI.

Exhibit 11: Bottom-up analysis for AllRing's revenue

(NT$mn)	2024	2025	2026e	2027e	2028e	2025 Y/Y	2026 Y/Y	2027 Y/Y	2028 Y/Y
CoWoS	3,530	4,771	8,055	13,500	14,400	35%	69%	68%	7%
CPO	0	150	200	3,000	4,500	NA	33%	1400%	50%
Flip Chip	200	0	900	200	0	-100%	NA	-78%	-100%
SoIC		120	150	600	700		25%	300%	17%
US customer				200	200				
Others	1,804	325	750	500	800	-82%	131%	-33%	60%
Total Revenue	**5,535**	**5,366**	**10,055**	**18,000**	**20,600**	**-3%**	**87%**	**79%**	**14%**

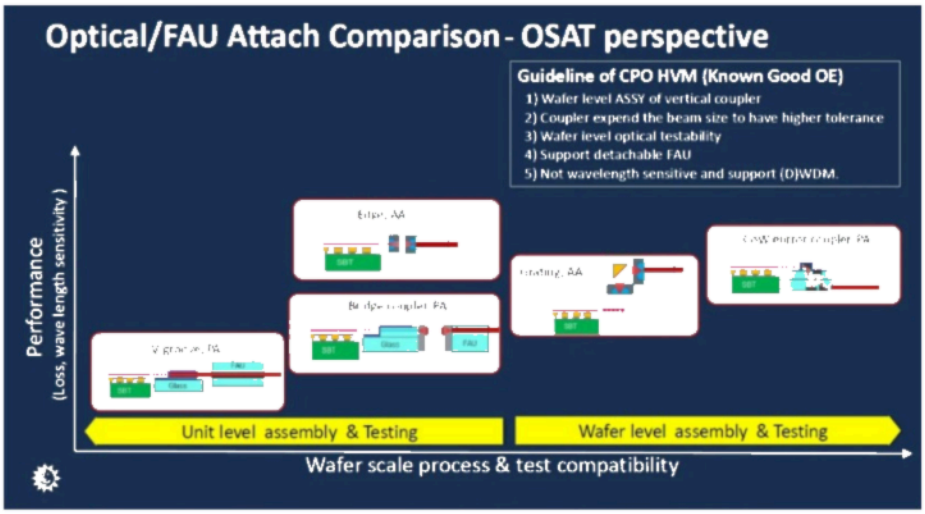
Revenue mix	2024	2025e	2026e	2027e	2028e
CoWoS	64%	89%	80%	75%	70%
CPO	0%	3%	2%	17%	22%
Flip Chip	4%	0%	9%	1%	0%
SoIC	0%	2%	1%	3%	3%
US customer	0%	0%	0%	1%	1%
Others	33%	6%	7%	3%	4%
Total Revenue	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Company data, Morgan Stanley Research (e) estimates

ASE runs much of the back-end CPO flow and buys the test equipment: In the Quantum-X supply chain, TSMC's COUPE integrates the EIC and PIC into the optical engine, and ASE/SPIL handles back-end packaging, including optical coupling and fiber alignment. For Spectrum-X Ethernet Photonics, NVIDIA named SPIL as the partner for chip-scale packaging and testing, alongside TSMC, Lumentum, TFC Communication, and Foxconn.

ASE plans CPO mass production by the end of 2026, covering optoelectronic integration, packaging, test and system co-design. Its subsidiary USI has acquired a controlling stake in Chengdu-based EugenLight Technologies to expand silicon photonics module capacity. As test content moves from the wafer (Insertions 1–2, run at the foundry) to the engine and package (Insertions 3–5, run at the OSAT), more of the test value accrues to ASE as service revenue. Longer testing times and new optical-electrical cells also raise capex intensity for its testing operations.

Exhibit 12: Fiber to PIC Assembly Solutions



Source: ASE

FAU Is Becoming Crowded

We downgrade FOCI to Equal-weight: FOCI was one of the first suppliers in Taiwan to develop fiber array units (FAUs) for CPO inside TSMC's silicon photonics ecosystem. The stock has been priced as a scarce Taiwanese supplier of a scarce component. However, over the past 12 months the supplier base has changed. We now count at least 10 companies with CPO FAU products shipping, sampling, or in pilot production. Three of them (Corning, Coherent, and TFC) should have larger roles than FOCI in NVIDIA's CPO programs in Rubin NVL576 generation. We therefore see FOCI's FAU market share as more challenging than a year ago when we initiated coverage.

Where we could turn more constructive on FOCI: Our downgrade to Equal-weight from Overweight is about the switch-CPO FAU market over the next 12-18 months, where FOCI faces larger, better-placed suppliers. However, the longer-term opportunity is optical I/O (OIO), where optical engines and FAUs are co-packaged directly with GPUs and other accelerators. OIO should multiply the number of FAUs per system, and FOCI has been preparing for it: it has shown a co-packaged optics architecture for multi-chip modules combining an XPU with HBM, and plans to advance MCM/OIO products with customers from 4Q26. Reworkable FAUs also matter more when the package being protected in a GPU rather than a switch. If FOCI can show design wins and share on OIO platforms as adoption widens, we would look to revisit our rating.

What FAU does and why architecture determines key beneficiaries

Traditional FAU is a mature, high-precision fiber-array assembly: Fibers are placed into V-grooves on a glass/silicon/quartz substrate, fixed with a cover and adhesive, polished, and then aligned to a PIC or optical engine. It is proven, customizable, and very low-loss, but assembly becomes more difficult as channel count and density rise. Key FAU suppliers for CPO include vendors such as Corning, Coherent, TFC Communication, FOCI, Senko, Browave, Sumitomo Electric, etc.

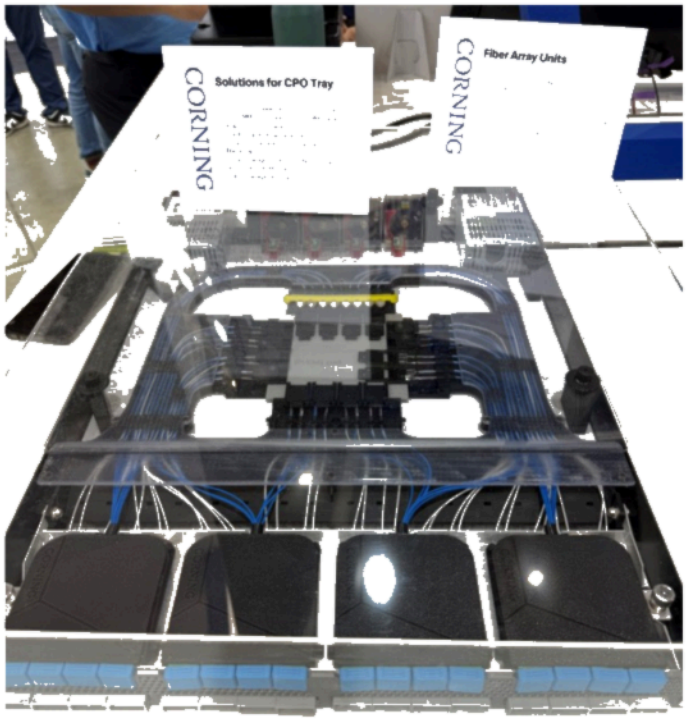
Coupling method: Grating coupling brings light into the top surface of the PIC; edge coupling brings it in from the side of the die. TSMC's mainstream COUPE platform and key customers' (NVIDIA, AMD, Ayar Labs) solutions for the next few years should still stick to grating coupling, because it is easier to achieve mass production. However, Corning's GlassBridge, for example, targets edge coupling.

Fixed vs. detachable: A fixed FAU is bonded permanently; a detachable FAU plugs into a socket on the package, which allows the optical engine to be tested before final assembly and the fiber to be replaced in the field. NVIDIA's Quantum-X CPO scale-out switch used a fixed interface with FAUs sourced almost entirely from TFC, and NVIDIA's Spectrum-X's move to a detachable connector opened second-source positions for other players. This shows how a single architecture change can redistribute share.

Channel density: CPO roadmaps move from single-row 1D arrays toward multi-row 2D arrays as bandwidth per engine rises. Recent launches show the shift. RAM Photonics and Sumitomo Electric have both shown 2D fiber arrays, and Largan has demonstrated four-layer stacking. Each step resets the qualification process.

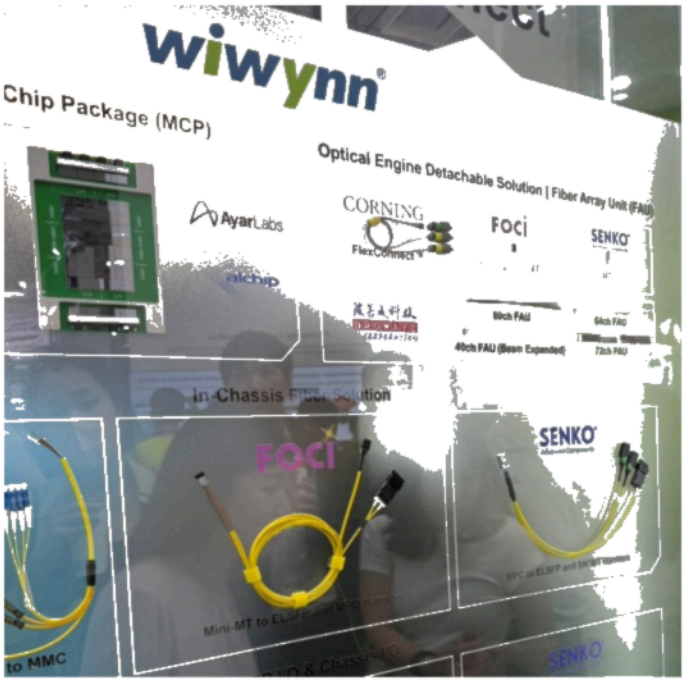
How fiber count raises difficulty: Fiber count rises with bandwidth. In a parallel design, each 200G lane needs its own transmit fiber and receive fiber. A 3.2T engine (16 × 200G) therefore needs 32 signal fibers, plus several polarization-maintaining fibers that carry light from external lasers, which is why 3.2T products use FAUs of about 40 channels. A 6.4T engine (32 × 200G) needs 64 signal fibers plus laser fibers, which points to about 80 channels. Fiber count grows roughly in line with bandwidth unless designs use wavelength-division multiplexing (WDM) to carry several lanes on one fiber. At the system level, Corning has said a 51.2T switch may need more than 1,000 fibers.

Exhibit 13: Corning's FAU/CPO demonstration



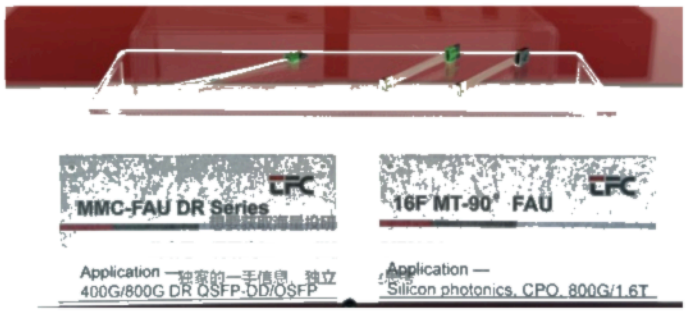
Source: Corning, Morgan Stanley Research

Exhibit 14: FAU demonstration at Computex for Ayar Labs scale-up solution



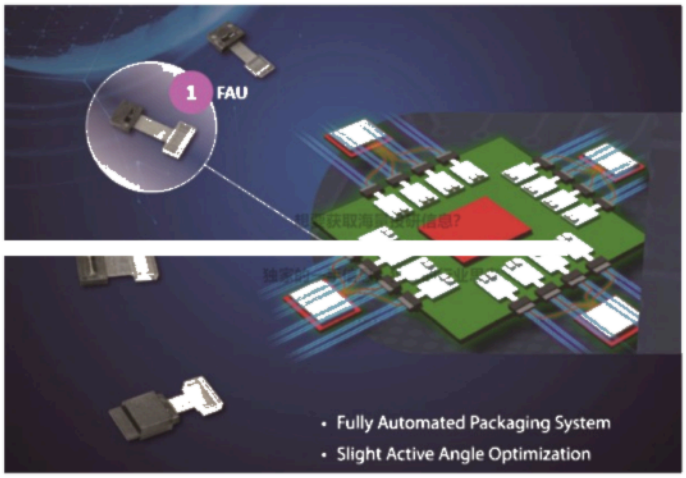
Source: Wiwynn

Exhibit 15: TFC's FAU



Source: TFC

Exhibit 16: FOCI's FAU solution for CPO



Source: FOCI

Major players within FAU production

FOCI (3363.TWO): The baseline

Strengths – FOCI was early and reworkable FAU could be critical for OIO: It was named in TSMC's silicon photonics ecosystem partner list and has been developing CPO FAUs with TSMC's COUPE platform for several years. Its reflow-compatible, reworkable FAU addresses a CPO problem – i.e., that if an FAU fails after bonding, the whole package can be lost, which is extremely important when OIO is packaged together with XPU.

FOCI's FAU shipments started in 3Q26, and August revenue rose 19.7% MoM. FOCI has said that its silicon photonics customers are mainly chip design houses serving high-performance computing. Its September investor presentation listed several MCM CPO packaging solutions already delivered and design-in plans with more than five other customers, although design-ins are not yet volume orders.

Challenges – scale and profitability: Its first FAU line mainly serves its first customer, with capacity for others planned for next year. Planned capex of about NT$1.54bn from 2026 to 2Q27 is large for FOCI but small against competitors' expansion plans. When CPO gets into scale, the volume, production, and reliability of FOCI's FAU could also be challenges in fulfilling customers' demand.

TFC (300394.SZ; covered by Andy Meng): The incumbent

Strengths – TFCs' CPO FAU and external laser source products are in stable delivery and it is adding capacity with customers: In September, TFC said it had already prepared ample capacity for customers' volume ramp next year. NVIDIA named TFC in the Spectrum-X Photonics production chain for laser module subassemblies, so it already sits inside NVIDIA's CPO supply chain. Its precision manufacturing base dates back to ceramic ferrules, where it took more than 40% global share.

Challenges – potential geopolitical risk: Recent DC meetings highlight 3.2T as the most likely generation to face restrictions on China-based optical transceivers (see Meta Marshall's report Telecom & Networking Equipment: Potential FCC Rules on Optical

Transceivers More Likely to Come in at 3.2T). Although FAUs are components rather than transceivers, so direct exposure is unclear, US customers have an incentive to qualify non-Chinese sources even though TFC has production in Thailand.

Implications for FOCI: The US policy angle is the strongest argument for FOCI as a non-China second/third source. But the supplier-broadening argument cuts both ways: it creates room for FOCI but equally for Corning, Senko, Coherent, and other entrants from Taiwan.

Corning (GLW.N; covered by Meta Marshall): The scale player

Strengths – Corning already designs and manufactures fiber harnesses with FAUs for CPO and has delivered CPO-optimized fiber, customized FAUs, pre-assembled harnesses and connectors: In May 2026, NVIDIA and Corning announced a multiyear commercial and technology partnership under which Corning will increase US optical connectivity capacity tenfold and build three new plants in North Carolina and Texas. Corning also controls fiber supply.

GlassBridge: GlassBridge, which is made by Corning, forms waveguides inside glass using a wafer-based ion-exchange process and relies on passive alignment. The first product supports chip core pitches of 30µm or more and targets coupling loss below 2dB. Corning is co-developing it with GlobalFoundries as a detachable edge coupler. However, it serves a different coupling ecosystem from NVIDIA's grating-coupled designs, and Corning positions GlassBridge as complementary to FAU-based solutions. We see GlassBridge as a 2028+ risk to the terminal value of grating-coupled FAUs, not a 2027 earnings issue. (see our report Greater China Semiconductors: CPO Supply Chain Updates; More on GlassBridge).

Implications for FOCI: Corning is FOCI's key competitor with the most capacity and the closest NVIDIA relationship. Its expansion is the main reason we think FAU pricing may not support the bull-case margin path for FOCI and might consume most of the FAU TAM FOCI is targeting.

Senko (privately held under Senko Group; covered by Takuya Osaka): The detachable-interface specialist

Strengths – detachable FAU solution: NVIDIA named Senko among its CPO collaborators when it launched its photonics switches at GTC 2025. In March 2026, Senko and Lightmatter (private) announced a detachable FAU combining Senko's metallic PIC coupler and optical interface with Lightmatter's expanded-beam technology. Lightmatter reports insertion and reinsertion loss below 1.5dB and says the design is compatible with mold-and-grind packaging, as demonstrated in ASE's flows. Because the interface uses passive expanded-beam alignment, it removes the need for active fiber alignment during assembly. Senko has also presented a detachable FAU with repeatability under 0.15d, supported by BizLink.

Challenges – detachable FAUs are still early in adoption and cover plate on FAU design is different from NVIDIA: Senko's FAU's cover plate design (SEAT™; which is used to align with the receptacle on PIC) is different from NVIDIA's design, which might not be able to ship to NVIDIA for the time being, in our view. Our industry checks suggest that Senko's design of the alignment for both cover plate on FAU and receptacle on PIC is different

from Nvidia's, which requires a patent. The company has not commented. We believe that if Senko sticks to its own design/patent and would not be willing to accommodate Nvidia's, it might not be the major supplier of Nvidia's FAU.

Implications for FOCI: FOCI's reworkable ReLFACon competes directly with Senko's detachable approach. If detachable connectors become standard across CPO roadmap, Senko's head start and partnerships would be a direct threat to FOCI's differentiation, we believe.

Coherent (COHR.N; covered by Meta Marshall): The vertical integrator

Strengths – ability to provide the total solution rather than FAU itself: Coherent's 2026 OFC investor presentation included FAUs, prism microlens arrays, CPO and NPO modules, and external and continuous-wave lasers within its CPO product range. It can bundle the FAU with the laser and optical engine. NVIDIA announced a multiyear strategic partnership with Coherent in March 2026, alongside one with Lumentum.

Implications for FOCI: Our checks suggest that Coherent could be one of the key FAU (or total solution/fiber kit) suppliers to NVIDIA for Rubin NVL576. If that's the case, it could pressure FOCI;s market share before the OIO generation is released.

Largan (3008.TW; covered by Andy Meng): The precision entrant

Strengths – high precision and ability to expand capacity: Largan says it can combine lower-precision, purchased V-grooves and standard fiber into a finished FA with accuracy below 0.3μm, against 0.5–0.8μm for most products on the market. It has shown four-layer stacked arrays, which matter for future multi-row designs. In July it confirmed its first order from a customer seeking mass production, with samples sent that month, a pilot line is due by end-3Q26, and volume production as early as mid-2027. It has also spent about NT$8.1bn on land and buildings since June, partly for CPO, and its automated equipment is designed in-house.

Challenges – still relatively new to FAU: In April, Largan management said FAU samples had not yet met loss targets and that building a production line would take one to two years. The timeline has since shortened, but the company still expects six months to a year between pilot and volume production, subject to customer certification. Its chairman has also said Largan may only make FA and micro lens arrays (MLA) rather than full FAUs, and that customer specifications remain single-row for now, with multi-row demand possibly three to four years out.

Implications for FOCI: Although Largan targets FA and MLA for the time being rather than the whole FAU, we still see the possibility for Largan to ship the whole FAU in future. Also, we don't rule out the possibility of Largan collaboratinge with other FAU suppliers, which may have further impact on FOCI's potential market share if that were to occur.

Sumitomo Electric (5802.T; covered bu Yu Shirakawa): The high-density specialist

Strengths – Sumitomo Electric was named in NVIDIA's GTC 2025 silicon photonics ecosystem with strong design capability: It has developed a 90-degree-bent two-dimensional fiber array for CPO switches, the 2D-FlexBeamGuidE, which arranges 72 single-mode fibers in a 6×12 grid. The company reports a height of 5.5mm, density of 24

fibers per mm and insertion loss below 0.5dB, with polarization-maintaining performance above 20dB. That design targets the multi-row, high-density FAUs that next-generation CPO will need. Sumitomo also makes optical fiber, connectors and semiconductor lasers, including high-power laser sources for CPO, so it can supply several parts of the optical path. Its optical device production is in Japan and Vietnam, which keeps it outside the scope of US measures aimed at Chinese suppliers.

Implications for FOCI: Sumitomo is a credible (in terms of the current quality and capacity) non-China source for the next-generation 80- and 100-channel, multi-row sockets FOCI is seeking for its 2027–28 growth. FOCI's channel-count roadmap is therefore entering a field where at least one established supplier has already shown a 72-fiber 2D design.

BizLink (3665.TW; covered by Derrick Yang): The system-level interconnect player

Strengths – System-level integration and collaboration with FAU/HPC vendors. BizLink completed its acquisition of Shenzhen-based Shin Fu Sheng in January 2026, adding fiber patch cords, MPO/MTP connectors and FAU technology, targeting 20- and 42-channel CPO FAUs. It is expanding fiber assembly capacity several times over in China and Taiwan. It also has partnered with SENKO and other ASIC vendors to provide the FAU alignment process for the CPO architecture.

Challenges – mass production experience: Though Bizlink has developed some optical alignment capability internally in the past few years, it does not have experience in mass production as of now, which could hinder it in bidding for more projects.

Implications for FOCI: BizLink can work with FAU vendors or chip vendors for the FAU alignment, so there is some room for cooperation between Bizlink and FOCI.

Other entrants

Browave (3163.TWO; not covered): FOCI's closest Taiwanese peer, already in NVIDIA's ecosystem

Browave was one of the 11 companies NVIDIA named in its silicon photonics ecosystem at GTC 2025 – alongside TFC, Senko, Corning, and Sumitomo Electric. Its CPO products focus on optical I/O: FAUs, fiber harnesses and fiber distribution (shuffle) boxes. Browave has production experience in planar lightwave circuit (PLC) fiber arrays and WDM micro-optics, including lens arrays, and co-designs with customers. Its CPO timeline calls for small-volume production in 3Q26, monthly volume in the thousands in 4Q26, and tens of thousands a month in 1Q27 if customer schedules hold. Browave plans to expand its Philippine plant two- to threefold, supported by its plant in Zhongshan, China.

Focused on shuffle boxes: Management has clarified that the thousands and tens-of-thousands volume targets refer mainly to shuffle modules rather than precision FAUs. Its MMC connector line depends on licensing from US Conec, and it buys its connectors from third parties. Part of its production sits in China.

Implication for FOCI: Browave competes for the same "Taiwan, non-China" position FOCI relies on, with NVIDIA ecosystem membership and a profitable base business to fund it.

Ability Opto (3362.TWO; not covered)

This company is aiming for volume production in 2027 and a target of about 30% of revenue from the product line. HST (private; non-covered) combines metalenses, mirrors and 2D FAUs into a pluggable multi-row product; its first line in Zhunan is planned at 200,000 sets a year, with trial production in 4Q26 and a target of 2028 scale-up CPO. Outside Taiwan, RAM Photonics (private) says its 2D fiber array has entered mass production with an architecture that scales to more than 1,024 fiber ports. Most of these are pre-revenue in CPO FAUs, but together they show how many suppliers will be competing for 6.4T and multi-row sockets.

Exhibit 17: FAU – Competitive landscape

Supplier	Type	CPO FAU status (Oct 2026)	Main strength	Main challenge	When it competes with FOCI
FOCI (3363 TWO)	Taiwan fiber components	Shipping 40-ch from 3Q26	Reflow-compatible, reworkable FAU; TSMC ecosystem ties; patents	Small scale; loss-making; customer concentration	—
TFC (300394 CH)	China optical components	Stable delivery of CPO FAUs and laser modules	NVIDIA incumbency; scale; 60%+ gross margin	China-based; customer concentration; US policy overhang	Now
Corning (GLW US)	Global fiber and glass	Delivering custom FAUs and harnesses; GlassBridge in co-development	Fiber supply; NVIDIA partnership; US capacity expansion	GlassBridge targets edge coupling and takes time	Now
SENKO	Japanese connectors	Detachable FAU with Lightmatter; NVIDIA collaborator	Detachable interface IP; expanded-beam passive alignment	FAU's cover plate design (SEAT™) might not be compatible to Nvidia current FAU/CPO module.	Now
Coherent (COHR US)	Vertically integrated optics	FAU and lens arrays in CPO portfolio	Can bundle FAU with lasers and engines; NVIDIA investment	FAU not core business	Now to 2027
Largan (3008 TT)	Taiwan precision optics	First FA order; pilot line end-3Q26; volume mid-2027 at earliest	Alignment precision; automation; multi-layer stacking	Yield unproven; may stay at FA level; customer acceptance	2027+
BizLink (3665 TT)	Taiwan interconnect	FAU sampling; small-volume CPO harness shipments	System-level interconnect; NVIDIA/SENKOrelationship	Mass production experience	2027+
Sumitomo Electric (5802 JP)	Japanese cable, fiber and laser group	In NVIDIA ecosystem; 72-fiber 2D FAU developed for CPO	Fiber, connectors and lasers in-house; 2D high-density design; non-China	FAU is a small part of the group	Now to 2027 (2D)
Others	Browave, Ability Opto, HST, RAM Photonics	Sampling to early production			2027–28
GlassBridge (Corning)	Alternative architecture	Co-development with partners	Wafer-scale glass waveguides; passive alignment	Edge-coupled; first product limited to 30µm+ pitch	2028+

Source: Company Data, Morgan Stanley Research

What crowding does to FOCI's numbers

For 2026, we expect Spectrum-X to be the mainstream scale-out CPO switch product, with the optical engine production number being 800k-1mn units, and total switch shipments being ~25-30k units given production lead time. We now expect Corning, Coherent, and TFC to be the major FAU suppliers, with FOCI taking 5-15% of total market share (vs. our previous assumption of 35%). Thus, we expect NVIDIA's contribution to FOCI's total revenue to be around 12% in 2026

Looking to 2027, our industry checks suggest that NVIDIA could introduce a CPO version of the NVL576 architecture, with the launch time likely in 2H27. As a result, we assume 5k and 20k units of CPO Rubin Ultra rack shipments in 2027 and 2028, respectively, with FOCI having 5-15% market share. Thus, we expect NVIDIA's total revenue to contribute around 82% and 90% of FOCI's total revenue in 2027 and 2028, respectively.

Downgrade FOCI from OW to EW

Our downgrade mostly reflects the competitive landscape and the capability for FOCI to expand the capacity as soon and as much as possible to meet customers' demand. This is also the main reason why we expect FOCI's market share to drop from 15% in 2026 to 8% in 2028 – the demand is growing so fast that our expected OE shipments from TSMC are growing from <500k units in 2026 to >70mn units in 2028. However, we believe FOCI will find it hard for capacity to catch up the demand growth – its capacity and production scale aren't comparable to other peers like Corning, TFC, or even Largan, etc.

We acknowledge FOCI's design capability, patent, and cooperation with TSMC which is the leader, in building the CPO ecosystem with its COUPE technology. However, when customers are desperate for CPO to scale and have components ready, we believe the automation and scale of FAU's capacity will also play an important role in market share.

We see potential for FOCI to announce another fundraising by the end of this year or early 2027 to expand capacity further after its recent small FAU production sample passed customers' qualification. Also, the production line for FAU could also be fully automated by end-2026 and running 24/7.

Where we could be wrong with our EW call

1. Capacity expansion: We expect OE shipments from TSMC to growing from <500k units in 2026 to >70mn units in 2028. We therefore expect almost all of the major FAU suppliers to expand capacity, including FOCI. The upside/downside surprise would be the pace of FOCI's capacity expansion.

2. Collaboration with other FAU suppliers: We don't rule out the possibility of FOCI collaboring with other total solutions providers like Corning, Coherent, etc. in future to provide FAUs or part of the FAU components.

3. More customers rather than just Nvidia: There are still multiple customers (probably more than 10) doing prototypes with potential to recognize NRE revenue in 2026, with mass production likely starting in 2027 or 2028, according to our supply chain checks. We haven't fully baked this into our FOCI model, and view it as only a bull case scenario as we await additional product launch and shipment signs in the supply chain. However, again, we think the capacity and automation would constrain FOCI's FAU shipments in the near term.

We raise our final OE shipment assumptions

We raise our final OE shipment forecasts from 7mn in 2027 and 48mn in 2028 to 17mn and 73mn, respectively. Although we lower our assumption for TSMC's average capacity in both years, we raise the SoIC (hybrid bond of EIC/PIC) utilization rate assumption to 95% because we have seen strong improvement from TSMC in the past year. Also, since the downstream assembly yield rate is already at 20-30% currently, we believe it's not too demanding to improve to 30% on average in 2027.

For this 17mn OE in 2027, we believe it's enough to support at least 5k equivalent of Rubin Ultra NVL576 server racks by assuming 2304 scale-up OE (18 switch trays per NVL72; four switches per tray; four OE per switch) and 768 scale-out OE (three switches per NVL72; 32 OE per switch) per rack.

Exhibit 18: Our new OE assumptions from TSMC PIC output

	2026e	2027e	2028e
TSMC average PIC capacity (kwpm)	**0.5**	**8**	**20**
Die per wafer	648	648	648
Annual PIC production (mn)	4	62	156
SoIC yield rate	50%	95%	95%
Optical engine production (mn)	2	59	148
Downstream assembly yield rate	20%	30%	50%
Actual Optical engine shipment (mn)	0.39	17.73	73.87

Source: Morgan Stanley Research estimates

Exhibit 19: Our previous OE assumptions from TSMC PIC output

	2026e	2027e	2028e
TSMC PIC capacity (kwpm)	**0.5**	**10**	**25**
Die per wafer	648	648	648
Annual PIC production (mn)	4	78	194
SoIC yield rate	50%	50%	50%
Optical engine production (mn)	2	39	97
Downstream assembly yield rate	20%	20%	50%
Actual Optical engine shipment (mn)	0.39	7.78	48.60

Source: Morgan Stanley Research estimates

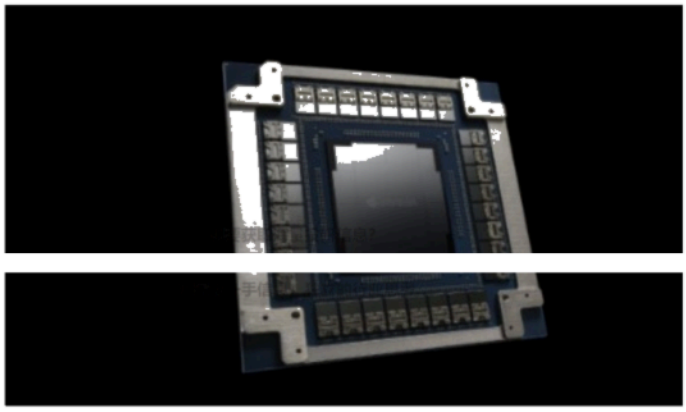
We also raise our ASP assumptions for FOCI 3.2T and 6.4T FAU to US$100 and US$220 from US$90 and US$180. However, we lower our market share assumptions for FOCI from 35% to 8-10% for 2027-2028.

Exhibit 20: Bottom-up analysis: NVIDIA's revenue contribution to FOCI in 2026-28e

	2026e	2027e	2028e
Rubin Ultra rack unit (k units)		**5**	**20**
Optical Engine content per Rubin Ultra rack		3072	3072
Scale-Up (NVLink switch/Quantum)		2304	2304
Scale-out (Spectrum)		768	768
Other scale-out switch optical engine consumption			
Spectrum-X (k units)	800	1,000	3,000
Quantum-X (k units)		1,000	3,000
Market Share Assumptions			
FOCI	15%	10%	8%
Others (TFC, Corning, etc.)	80%	85%	85%
FAU ASP Assumptions			
FAU ASP (6.4T; US$)	220	220	220
FAU ASP (3.2T; US$)	100	100	100
FAU ASP (1.6T; US$)	45	45	45
FOCI Revenue contribution from NVIDIA			
Revenue contribution (US$mn)	9	186	597
Revenue contribution (NT$mn)	261	5,568	17,914
FOCI CY Revenue (NT$mn)	2,100	6,791	19,914
% of total revenue	12%	82%	90%

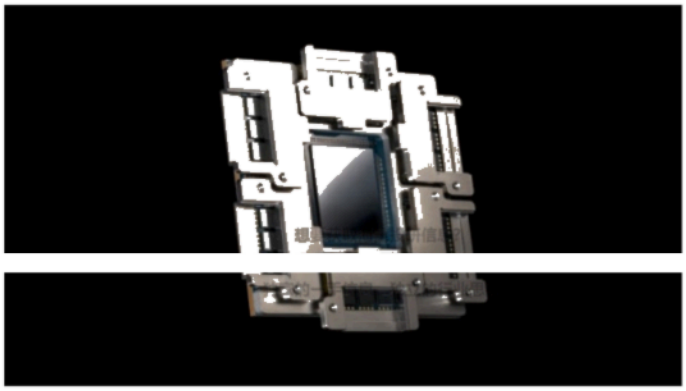
Source: Company data, Morgan Stanley Research (e) estimates

Exhibit 21: Spectrum-X CPO Switch



Source: NVIDIA

Exhibit 22: Quantum-X CPO Switch



Source: NVIDIA

When we could turn more constructive on FOCI: Our Equal-weight rating reflects our view on switch-CPO FAUs between now and 2027, where we think FOCI's share and margins will come under pressure. We note that optical I/O is a different and potentially larger opportunity, and any positive signs on this could lead us to revisit our rating.

Why could FOCI be better placed in OIO than in switches? FOCI was positioned early. At its November 2025 investor conference it showed a co-packaged optics architecture for multi-chip modules combining an XPU with HBM, and it lists MCM/OIO co-packaged optics among products advancing with customers from 4Q26.

Reworkability also carries more weight in OIO. A failed fiber interface on a GPU package destroys far more value than one on a switch package. FOCI's reflow-compatible, reworkable ReLFACon design addresses that risk directly, so it may count for more with accelerator customers than with switch customers.

For Optical I/O or optical engine on interposer adoption plans, we see NVIDIA exploring multiple solutions for the next-generation Feyman and Feyman Ultra's platform, but whether this is introduced or not will still take time. For other solutions, we see AMD targeting a scale-up CPO version for its MI550 or MI650 rack system in 2027/2028, based on its development progress. We also see ASIC vendors exploring CPO on GPU.

FOCI's plans for capacity

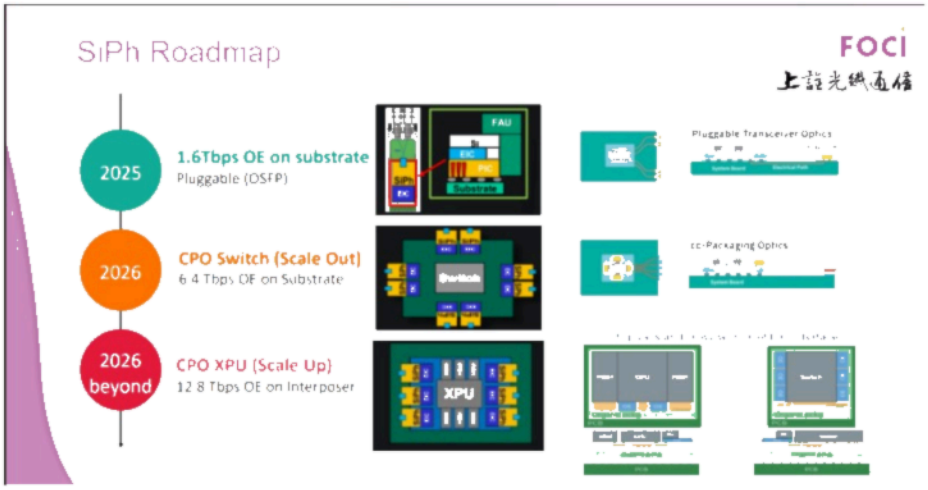
In its public offering disclosure early this year for the SEO, FOCI disclosed its projected revenue and profitability for the NT$1.538bn in capex. The company completed its SEO plan in early February, with total acquired capital of NT$3.1bn. However, we believe the capacity is far from enough to meet the whole industry demand. We therefore see potential for FOCI to announce another fund raising by the end of this year or early 2027 to expand capacity further after the recent small FAU production sample passed customers' qualification.

Exhibit 23: FOCI's projected revenue and profitability from NT$1.538bn in capex

Year (NT$mn)	2026	2027	2028
Sales Revenue	518	2,398	3,980
Gross Profit	198	906	1,598
Gross margin	38.2%	37.8%	40.1%
Operating Profit	38	483	1,012
Operating margin	7.3%	20.1%	25.4%

Source: Company data, Morgan Stanley Research

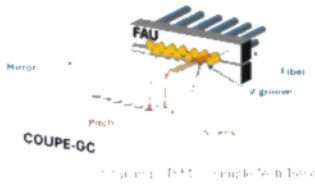
Exhibit 24: FOCI's SiPh Roadmap

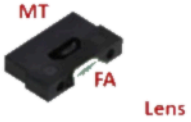


Source: FOCI

Exhibit 25: FOCI's solutions for CPO

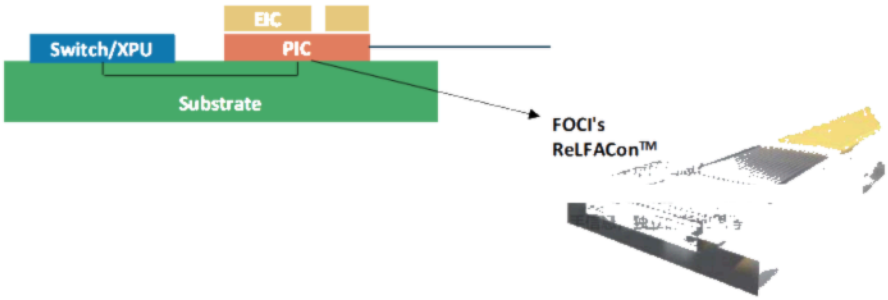
Challenges	FOCI Advanced Technologies
☐ High-bandwidth requirements for high-density fiber arrays (20, 40, 80 channels & beyond)	☐ Completed 20, 40, and 80 channels FAU development
☐ High-bandwidth FA requirements for lens	☐ Years of collaboration with lens manufacturers (meeting different bandwidth requirements)
☐ High-bandwidth FA requirements for MT	☐ Self-developed black high-density connector (extremely high optical density and low loss)
☐ FAU precision packaging technology for PICs	☐ Multi-chip module CPO samples released
☐ FAU high-temperature failure in co-packaging	☐ ReLFACon™ patented technology
☐ Challenges of optical testing for FAU & packaging	☐ Automated equipments for testing process





Source: FOCI

Exhibit 26: ReLFACon enables direct transmission of external photonic signals with MCM modules to achieve reliable signal transmission



Source: FOCI

What about China? Could NPO be the solution rather than CPO?

We expect near-packaged optics (NPO) to become the main optical interconnect in China's AI computing systems from 2027, ahead of co-packaged optics (CPO). Copper will keep the shortest links inside a server tray, and pluggable optics will remain in scale-out networks. For the scale-up links that join thousands of accelerators into one system, we think NPO is the option China can build, standardize, and maintain with its own supply chain.

The case rests on China's constraints. Domestic AI chips are weaker per chip than NVIDIA's, so Chinese system makers build much larger scale-up domains to compensate. Huawei's Atlas 960E SuperPoD connects up to 4,096 NPUs in one system, against 72 or 144 GPUs in an NVIDIA rack. Domains that span dozens of cabinets are beyond copper's reach and must be optical. CPO, the other high-density optical option, depends on TSMC's co-packaging processes, which Chinese AI chipmakers cannot use. NPO keeps the optical engine as a separate, replaceable part on the board a few centimeters from the chip, so the chip can use domestic packaging and the engine can come from domestic optical suppliers.

Four ways to connect accelerators

AI systems connect accelerators in two layers. Scale-out networks link servers and racks through switches, usually with pluggable optical modules. Scale-up networks link accelerators into a single high-bandwidth domain so they can share memory and act as one machine. Scale-up is where the copper-versus-optics decision is being made.

Copper: Electrical links over cables or backplanes. Copper is cheap, reliable and low-latency, but its reach falls as lane rates rise; at 200G per lane, links are limited to a few meters. Copper-based AI racks have to pack computing extremely tightly to stay within reach, which creates manufacturing, power-density and cooling problems, and copper cannot cover scale-up domains of more than about a 100 accelerators.

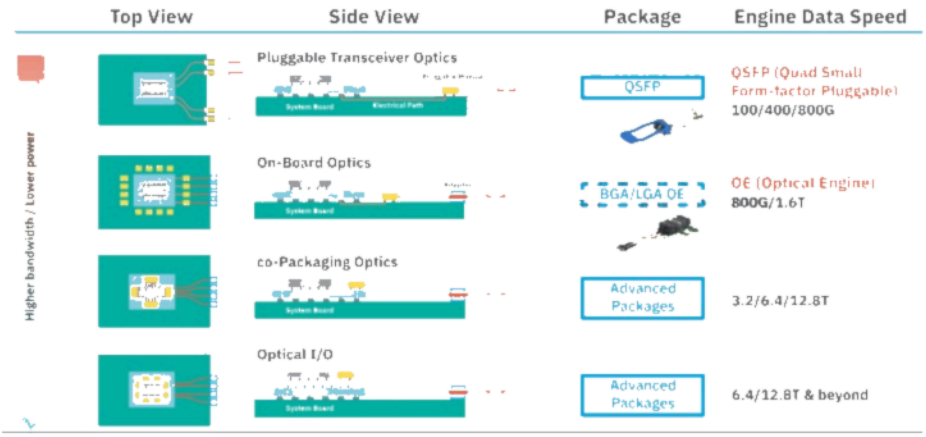
Pluggable optics, including LPO: Modules plug into the front panel of a switch or server. Conventional modules contain a DSP that re-times the signal; linear-drive pluggable optics (LPO) remove the DSP to cut power and latency. Huawei's current Atlas 950 SuperPoD uses LPO.

NPO: The optical engine moves off the front panel onto the main board, a few centimeters from the switch or computing chip, and plugs into a socket. Huawei's Hi-ONE leaves about 5cm of copper between the computing package and the optics. Alibaba's module uses a standard LGA connector, so the engine can be tested on its own, screened for yield and replaced in the field.

CPO: The optical engine sits inside the chip package. CPO gives the best power and density, but the engine and the chip share a package, so yields are combined and a failed engine is hard to replace. NVIDIA's Spectrum-X Photonics switches, now in production, are

built on TSMC's COUPE process with SoIC stacking.

Exhibit 27: CPO evolution progress



Source: ASE

We compare copper-based interconnects, pluggable optical transceivers, near-package optics (NPO), and co-packaged optics (CPO) in Exhibit 28. Copper is the mainstream option for short-reach scale-up connectivity, with passive cables offering low cost, low power consumption, and very low latency, while limited transmission distance constrains broader deployment.

Pluggable optical transceivers are the mainstream solution for scale-out networks, combining longer reach and straightforward maintenance with higher power consumption and signal latency.

NPO and CPO are emerging as alternatives for both applications, combining shorter electrical links and higher density with lower power consumption than the pluggable modules shown. NPO occupies an intermediate position, balancing higher lane speeds and density with relatively accessible maintenance. CPO offers the highest stated lane speeds and interconnection density, alongside the shortest electrical links, although its cost and maintenance requirements present greater challenges.

Exhibit 28: Comparison of Copper and Optical Interconnect Architectures

	Copper / Electrical	Pluggable Optical Transceiver Module	NPO (Near Package Optics)	CPO (Co-package Optics)
Speed limit (Gbps per lane)	100Gbps (can reach 200Gbps by DAC)	200Gbps	200Gbps to 400Gbps	400Gbps+
Transmission distance	1m to 2m	500m to 10km	100m to 2km	100m to 2km
Electrical link length	1-2m end-to-end for DAC	150–250 mm	30–100 mm	<15 mm
DSP integrated	No (DAC) / Yes (AEC)	Yes	No	No
Power consumption	Low (DAC) / Medium (AEC)	High	Low	Low
Ease of maintenance	High	High	Medium–High	Low
Signal latency	Very low (DAC) / Low (AEC)	High	Low–Medium	Low
Interconnection density	Low–Medium	Medium	High	Very high
Current cost	Low	Medium	High	Very high
Scale Out use case	N/A. distance limit	Mainstream	Emerging	Emerging
Scale Up use case	Mainstream	N/A. budget and power limit	Emerging	Emerging

Source: Morgan Stanley Research

Why China is different

Weaker chips force larger scale-up domains

Huawei's Ascend 960DT offers roughly half the FP8 computing and a third of the FP4 computing of NVIDIA's B300, which NVIDIA cannot sell in China. Chinese system makers compensate for the lack of computing by connecting more chips. Huawei's Atlas 960E holds up to 4,096 NPUs in one SuperPoD. Huawei's simulation claims that a 100,000-NPU cluster built from 4,096-NPU SuperPoDs achieves 2.75 times the model FLOPs utilization of a cluster built from 8-NPU servers, because cross-server communication otherwise takes up more than 40% of training time. A 4,096-chip domain spread across dozens of cabinets cannot be wired with copper, so optics are a requirement for China's system design.

Weaker SerDes favor a shorter electrical path

LPO would work better when bandwidth needs are moderate and the host chip's SerDes are strong, while NPO is more suitable when bandwidth density is high or the chip's SerDes are not strong enough. Alibaba also says NPO lowers the SerDes performance required of the main chip compared with LPO. Chinese accelerators and switch chips are

built on less advanced processes than their US counterparts, so a shorter electrical channel directly eases one of their design limits.

CPO depends on packaging China cannot access

Production CPO today relies on TSMC's COUPE optical engine process and advanced 3D stacking. Chinese AI chipmakers cannot use TSMC for advanced AI chips. NPO separates the optical engine from the ASIC package, so the ASIC can use domestic 2.5D packaging and the engine can be built on mature 2D processes. Alibaba's 3.2T NPO module, for example, flip-chips two 16-channel silicon photonics chips and linear driver/TIA chips onto an mSAP substrate using mature 2D packaging.

Serviceability matters more in very large systems

A 4,096-NPU system contains thousands of optical links. With CPO, a failed engine can take a switch or accelerator package out of service. With NPO, the engine can be swapped. Huawei says its Hi-ONE design doubles fault-free operating time and lifts system availability to 99.8% compared with a pluggable-based design. Alibaba says its NPO switch supports module-level hot swapping, so a failure affects the smallest possible unit. Alibaba's team describes long-term stability and failure rates as the deciding factor for whether all-optical scale-up can be deployed at scale.

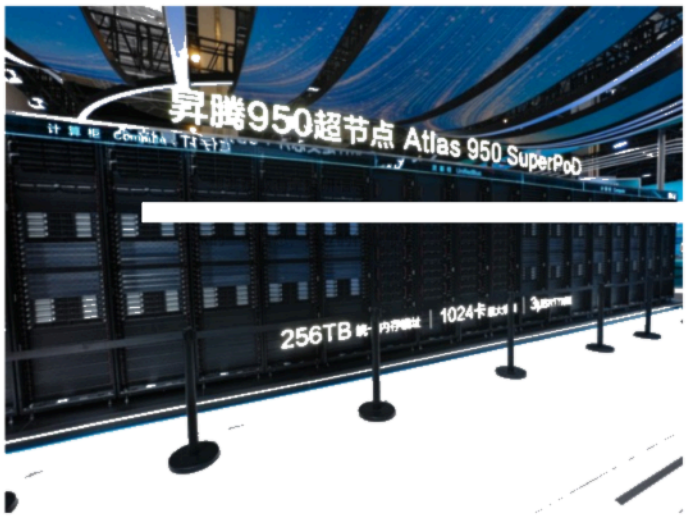
Who is deploying NPO?

Huawei: from LPO in the Atlas 950 to NPO in the Atlas 960E

Huawei's current Atlas 950 SuperPoD, shown at WAIC 2026, connects the 8 NPUs within each computing tray electrically, around 4,096 800G optical transceivers in the 1,024-NPU system on display, about four per NPU, and described it as the first SuperPoD to use LPO, based on Huawei's 100G VCSEL technology.

The Atlas 960E moves to NPO. Huawei's Hi-ONE engine carries 7.2 Tb/s with a built-in light source and is, according to Huawei, the first NPO engine with an integrated light source to reach mass production. It integrates 36 transceiver channels and uses linear direct drive with no oDSP, which Huawei says cuts latency by about 90% and power use by about 66% against a conventional pluggable. Huawei says 5,500 Hi-ONE engines replace the 48,000 800G modules a conventional design would need, cutting system power by more than 550kW. The bandwidth matches: 5,500 × 7.2 Tb/s is 39.6 Pb/s, against 38.4 Pb/s for 48,000 × 800G. The air-cooled version is due in 2Q27 and the liquid-cooled version in 3Q27, with the Ascend 960DT chip pulled forward to 1Q27.

Exhibit 29: Huawei Ascend 950 SuperPod with a scale-up range to 8,192 chips



Source: Huawei

Exhibit 30: Ascend 950 SuperPod still adpots 800G optical transceivers



Source: Huawei

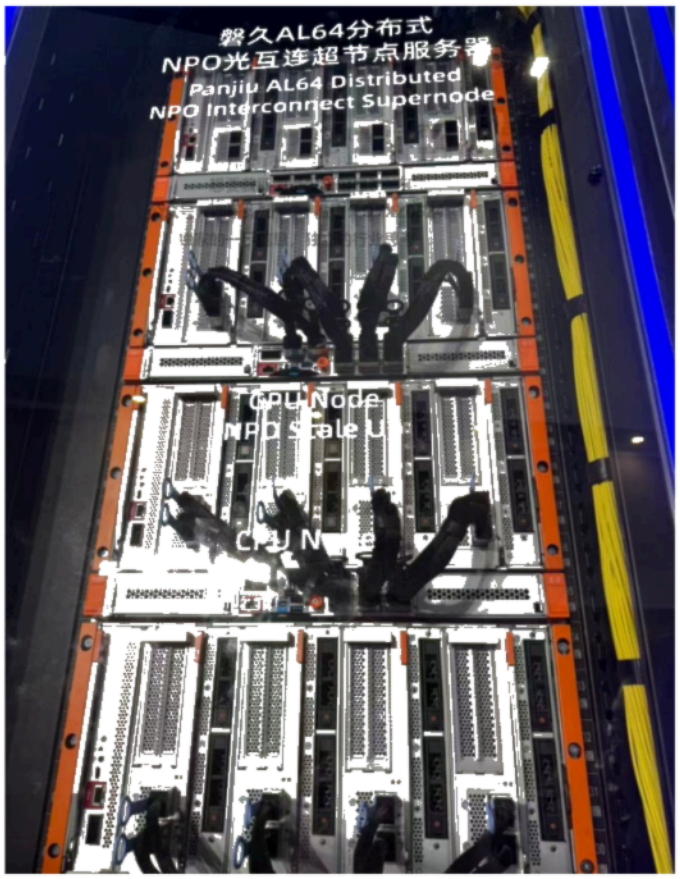
Alibaba Cloud: NPO as the core of all-optical scale-up

Alibaba connects 512 accelerators through a single-layer CLOS network of optical links and eliminates high-speed copper inside the rack. Alibaba names LPO and NPO as the preferred optical options and says they reduce optical cost by 30-40%.

Alibaba has since powered up a 3.2T NPO module in the OIF package format, measuring 22.5mm × 35.1mm. It reports typical power of about 20W, a TDECQ (Transmitter and Dispersion Eye Closure Quaternary) of 1.9dB and compliance with the IEEE (Institute of Electrical and Electronics Engineers) 802.3bs DR4, so it can inter-operate with conventional DSP-based modules. The module is deployed in a switch built on four domestic 25.6T switch chips, giving 102.4T of capacity with a path to 409.6T. The switch has passed power-on and functional validation and is in long-term reliability testing. Alibaba is also working with other internet companies to set a 6.4T standard (UPO) through the ODCC (Open Data Center Committee).

At APSARA 2026, Alibaba introduced its NPO scale-up solution called AL64, which it said could link up to 1,024 NPUs through NPO networking.

Exhibit 31: Panjiu AL64 adopts NPO to conduct scale-up networking



Source: Alibaba

Exhibit 32: Alibaba showcased its NPO solutions at APSARA 2026



Source: Alibaba

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Global Implications

Greater China Semiconductors (covered by Charlie Chan)

ASE LEAP revenue may reach US$9bn in 2027 (higher than the company's latest guidance of >US$7.5bn)

Our bottom-up analysis suggests that ASE's LEAP revenue is likely to reach US$9bn in 2027, given strong demand from both oS (on substrate) outsourcing, CPU CoWoS needs, and new CPO demand, higher than company guidance of >US$7.5bn. The demand is mostly from oS outsourcing from TSMC. While ASE remains the major oS supplier to NVIDIA GPU, our checks also indicate that the majority of Google TPU and AMD MI400 series is likely to be outsourced to ASE, given TSMC's clean-room limitations. We think the dollar content per chip for oS at ASE could range from US$100 to US$250 in 2026, depending on the material cost, chip size, and margin of each product. Our assumption of the oS outsourcing percentage from TSMC of major products is – NVIDIA almost 100%, TPU 70-90%, MI400 80%.

Meanwhile, our channel checks suggest that AMD's Venice CPU could go for full CoWoS-like packaging at ASE Group (both ASE and SPIL). The initial allocation could be more at SPIL given SPIL's better production capability. Then, the allocation could reach 50:50 between SPIL and ASE. By assuming US$8k per CoWoS wafer cost at ASE by comparing the pricing to TSMC CoWoS and that the chip per CoWoS wafer could be around 25-26 chips for Venice CPU, we expect the dollar content per Venice CPU to be slightly above US $300.

For CPO, we also expect ASE to play a significant role in both packaging and testing. The whole process may include testing from insertion 3, insertion 4, SLT, optical engine mounted on the substrate, FAU attachment, etc. We assume the dollar content for the packaging could be around US$30 per OE and could be more than double if it includes the testing process.

Exhibit 33: Further breakdown of our ASE LEAP revenue forecasts

	1Q25	2Q25	3Q25	4Q25	1Q26	2Q26e	3Q26e	4Q26e		2025	2026e	2027e
Units (k)												
Nvdia (Units k)												
Blackwell with GDDR7	-	-	300	500	250	250	250	250		800	1,000	
Blackwell with HBM	1,000	1,100	1,400	1,500	1,500	1,500	1,600	300		5,000	4,900	560
Rubin							800	1,200			2,000	7,000
Quantum-X (CPO)												2,880
Spectrum-X (CPO)												300
AMD (Units k)												
MI400 Series (assuming 80% outsource from TSMC)						24	120	240			384	1,000
Venice CPU						100	400	500			1,000	4,400
Google (Units k)												
TPU (assuming 70-90% outsource from TSMC)										1,225	2,856	6,930
Others (Units k)												
Vera CPU											2,070	4,025
Maia, Trainium2/3, etc.										120	200	400
Dollar content assumption per chip												
Blackwell (oS)	180	180	180	180	200	200	200	200		180	200	240
Rubin (oS)							230	230		-	230	276
Quantum-X (CPO)												120
Spectrum-X (CPO)												960
MI400 Series (oS)						230	230	230		-	230	276
Venice CPU (Full CoWoS)						320	320	320		-	320	416
TPU (oS)										150	150	180
Vera CPU (oS/CoWoS)						200	200	200			200	240
Others (oS/Full CoWoS)						120	120	120		120	120	144
Advanced packaging revenue from each product (US$mn)												
Blackwell (oS)	180	198	306	360	350	350	370	110		1,044	1,180	134
Rubin (oS)							184	276		-	460	1,932
Quantum-X (CPO)												346
Spectrum-X (CPO)												288
MI400 Series (oS)						6	28	55		-	88	276
Venice CPU (Full CoWoS)						32	128	160		-	320	1,830
TPU (oS)										184	428	1,247
Vera CPU (oS)											414	966
Others (oS/Full CoWoS)										14	24	58
Total Revenue from oS outsource										***1,235***	***2,583***	***4,585***
Total Revenue from full CoWoS-Like process										***7***	***332***	***1,859***
Total Revenue from CPO packaging												***634***
Total advanced packaging revenue (US$ mn)										1,242	2,915	7,077
ASE LEAP revenue guidance										1,600	3,700	7,500
% of ASE LEAP revenue guidance										78%	79%	94%
Wafer Sort Revenue (from ASE guidance/ 2027 MSe)										400	800	2,000
Total MSe LEAP revenue (US$ mn)										**1,642**	**3,715**	**9,077**

Source: Company data, Morgan Stanley Research, e = Morgan Stanley Research estimates.

Exhibit 34: ASE LEAP revenue breakdown by customers

	2025	***2026e***	***2027e***
Total MSe LEAP revenue (US$ bn)	1.6	3.71	9.08
ASE Guidance on LEAP revenue (US$ bn)	1.6	3.70	>7.5
Nvidia Revenue	1.3	2.1	3.7
% of MSe LEAP Revenue	78%	57%	41%
TPU Revenue	0.3	0.5	1.6
% of MSe LEAP Revenue	16%	14%	18%
AMD Revenue	0.1	0.6	2.5
% of MSe LEAP Revenue	4%	15%	28%

Source: Morgan Stanley Research, e = Morgan Stanley Research estimates.

KYEC also benefits from strong GPU/TPU/CPU demand

In our earlier GUC report, we mentioned that demand for Google CPUs is very strong. We now forecast Google CPU shipments of 1.2-1.3mn units this year and around 4mn units in 2027 with around 3mn units of Axion2 and 1mn units of Axion3. Per our published forecast, the Axion3 FT time could also double from Axion2 to around 600 seconds given two computing dies and larger chip size.

Our checks also indicate that this Google CPU requests burn-in and SLT (system-level testing), which we believe could generate 1-2% of KYEC 2026 revenue and 5-10% of 2027e. To sum up, we now forecast that Google-related demand could account for 10-15%

of KYEC's 2027 total revenue, including TPU, CPU, FT, and part of the CP.

Although our checks suggest that R-series XPU final test time might ramp from 800-900 seconds, not much higher than the prior generation, the test still may recover when KYEC has more capacity. We also break down the CPU demand from the major customer, including G-series and V-Series CPU. We expect sharp testing time improvement from c. 300 seconds to c. 700 seconds – CPU design and chip size are both getting more complicated as generation/geometry migrates for heavier AI inferencing and orchestration workload. Those CPUs also require burn-in for better performance.

Overall, we expect that B-series XPU could maintain momentum in 3Q26 despite the ramp-up of R-series. Combined with new products like 3nm TPU and 2nm smartphone SoC from MediaTek, we forecast revenue growth for KYEC of 10-15% QoQ in 4Q26. Overall revenue from the largest customer should be more than 40% of KYEC's total revenue in 2026. Overall, we forecast AI-related offerings to still contribute 25-30% to KYEC's revenue in 2025, >35% in 2026, and >45% in 2027 (including TPU and chip probing).

Exhibit 35: KYEC: Testing revenue (excluding wafer sort) from major customers

	1Q25	2Q25	3Q25	4Q25	1Q26	2Q26e	3Q26e	4Q26e		2025	2026e	2027e
Units (k)												
H-series	650	200	250	500	400	400	600	600		1,600	2,000	
B-series with GDDR7	-	-	300	500	250	250	250	250		800	1,000	
B-series with HBM	1,000	1,100	1,400	1,500	1,500	1,500	1,600	300		5,000	4,900	560
R-series							800	1,200			2,000	6,500
G-series CPU										1,100	2,450	250
V-series CPU											2,500	5,750
Google TPU										1,750	3,680	4,500
Google CPU											1,200	4,000
Test time												
Per chip test time (seconds)												
H-series test time	350	350	350	350	350	350	350	350		350	350	350
B-series with GDDR7 test time			350	350	350	350	350	350		350	350	350
B-series with HBM test time	700	750	900	1,000	1,000	1,000	850	850		1,000	850	850
R-series test time							850	850			850	1,275
G-series CPU test time										300	300	300
V-series CPU test time											700	700
Google TPU blended test time										186	340	450
Google CPU test time											300	400
Total test demand (k hrs)												
H-series	63	19	24	49	39	39	58	58		156	194	-
B-series with GDDR7			29	49	24	24	24	24		78	97	-
B-series with HBM	194	229	350	417	417	417	378	71		1,190	1,282	132
R-series					-	-	189	283			472	2,302
G-series CPU										92	204	21
V-series CPU											486	1,118
Google TPU										90	348	563
Google CPU											100	444
Test hour rate (for the largest customer including burn-in)	***170***	***170***	***170***	***170***	***170***	***170***	***180***	***190***		***170***	***178***	***200***
Test hour rate (for TPU with self-bought testers)										***200***	***250***	***280***
Largest customer's AI revenue to KYEC (US$ mn)	43.8	42.3	68.6	87.4	81.6	81.6	116.9	83.0		257.6	485.5	714.6
% of KYEC MSe Revenue (quarterly figures without CPU)	19%	15%	23%	27%	25%	23%	30%	18%		23%	32%	33%
TPU revenue to KYEC (US$ mn)										18.1	86.9	157.5
% of KYEC MSe Revenue										1.6%	5.7%	7.3%
Google CPU revenue to KYEC (US$ mn)											25.0	124.4
% of KYEC MSe Revenue											1.6%	5.7%

Source: Company data, Morgan Stanley Research. e = Morgan Stanley Research estimates

WIN Semi could benefit from PD growth and potential outsource of the LD by late 2027; upgrade from UW to EW

In our previous WIN Semi report, we noted that Lumentum (LITE.O, covered by Meta Marshall) is unlikely to outsource CW lasers or EML to WIN Semi, which was the main thesis for our UW rating. However, our recent checks suggest that WIN Semi and its largest customer (Broadcom) have secured InP substrate and could show substantial growth for the PD (photo diode) business in 2H26, which could account for >10% of WIN Semi's total revenue. Our recent checks also suggest that Broadcom could outsource LD

(laser diode) production to WIN Semi given insufficient internal capacity. Our checks indicate that Broadcom could be one of the top four suppliers for Nvidia's CPO laser diode (Lumentum and Coherent are two of the others).

We also see WIN Semi with even stronger revenue growth from its aerospace business into 2027, especially from the ground station and satellite business. With SpaceX's (SPCX; covered by Adam Jonas) launch of its Starship and Starlink V3 satellite, we expect the content value per satellite for WIN Semi to increase largely from Starlink v2 to v3, as well as future DTD (direct to device) satellites. The content improvement comes not just only from the RF chips volume increase, but also the material migration from GaAs to GaN, of which the 4-inch GaN ASP could be US$9k from our industry checks (vs. 6-inch GaAs of around US$2.5-3k). We therefore upgrade from UW to EW.

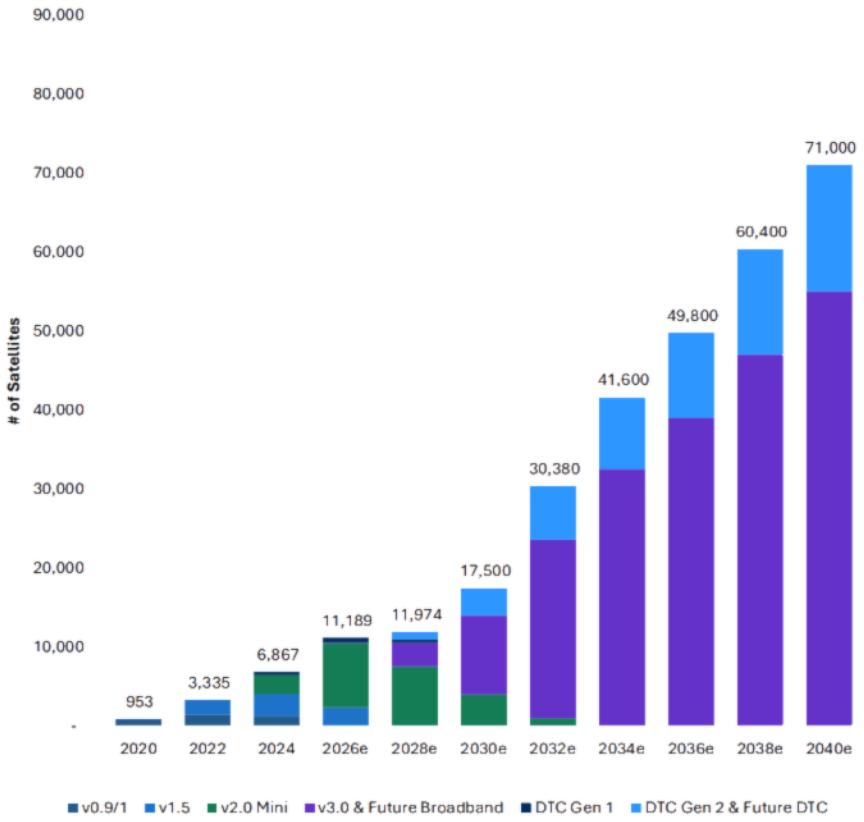
Where we could be wrong with our WIN Semi EW call: We think the largest swing factor for WIN Semi in the near term would be the aerospace business, which we think is relatively hard to track given the satellite launch could always come with certain possibility of a delay or failure. However, on September 28, 2026, SpaceX successfully launched the Starship with Starlink V3 satellite. If SpaceX decides to speed up the satellite constellation, there also might be upside to our forecast.

Exhibit 36: WIN Semi's Aerospace revenue projection

	2025	2026e	2027e	2028e
WIN Semi Total Revenue (MSe, NT$mn)	16,639	21,499	28,255	40,029
Infra to total revenue	33%	30%	38%	35%
Aerospace to Infra	30%	35%	38%	40%
Aerospace to total revenue	10%	11%	15%	14%
Aerospace Revenue (MSe, NT$mn)	1,625	2,283	4,127	5,589
Ground station	650	975	1,462	2,194
Satellite	543	789	2,043	2,649
Others	432	518	622	746
New Launched Satellite (units)				
v0.9/1	-	-	-	-
v1.5	-	-	-	-
v2.0 Mini	2,912	3,058	-	-
v3.0 (and Future Broadband Generations)	-	75	905	2,020
Mobile Gen 1 (DTD)	286	-	-	-
Mobile Gen 2 (and Future Generations)	-	-	480	520
Content Value to WIN Semi (per satellite; US$k)				
v0.9/1	NA	NA	NA	NA
v1.5	NA	NA	NA	NA
v2.0 Mini	5	5	5	5
v3.0 (and Future Broadband Generations)	35	35	35	40
Mobile Gen 1 (DTD)	10	10	10	10
Mobile Gen 2 (and Future Generations)	50	50	50	50
Total Revenue to WIN Semi (per satellite; NT$mn)				
v0.9/1	NA	NA	NA	NA
v1.5	NA	NA	NA	NA
v2.0 Mini	456	379	-	-
v3.0 (and Future Broadband Generations)	16	261	1,287	2,004
Mobile Gen 1 (DTD)	71	-	-	-
Mobile Gen 2 (and Future Generations)	-	149	756	645
Total Revenue to WIN Semi (from satellite)	543	789	2,043	2,649

Source: Morgan Stanley Research est mates

Exhibit 37: Projection of SpaceX's Numbers of Satellite



Source: Company data, Morgan Stanley Research e = Morgan Stanley Research estimates

Greater China Hardware (covered by Derrick Yang)

Chroma (2360.TW): Multiple drivers from the AI-related testing and metrology market

Dominant in GPU SLT and stepping into FT handlers

Chroma has been the dominant supplier of SLT tools in the HPC market. It has been the sole supplier to NVIDIA's GPUs, and it is seeing more interest from HPC vendors in SLT for their CPU and accelerators.

Besides expanding demand for GPU and accelerators in AI deployment, Chroma's SLT business should also benefit from ever-increasing power density from those advanced chips as the test equipment specs also need to be upgraded. We estimate that the SLT business will account for ~20% of Chroma's total revenue in 2026.

In the HPC testing market, Chroma used to focus more on SLT, but it has decided to leverage its existing expertise and customer relationships to penetrate the final test handler market, which we believe represents an even bigger market opportunity than SLT. Moreover, it will penetrate the market for burn-in ovens for HPC in the coming quarters.

Exhibit 38: SLT and FT equipment offerings from Chroma



Source: Chroma

Fast-growing metrology business amid advanced packaging capacity expansion

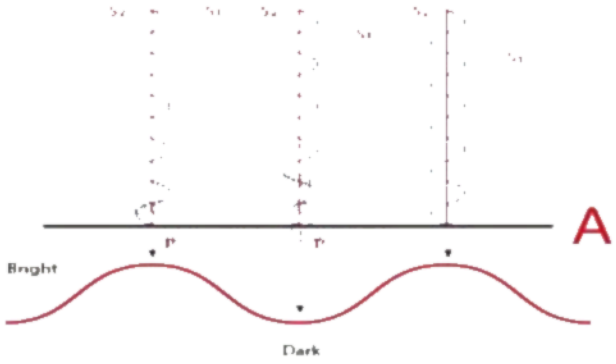
In 2025, Chroma started to supply metrology equipment that is used in the probe mark, RDL and TSV structures in the advanced packaging process, with its customer base including foundry and OSAT players.

Chroma's metrology equipment employs white light interferometry technology. The basic working principle is to have white light emitted on the reference mirror and the sample, which is placed at the same distance from the light source. The reflected beams from the reference mirror and sample surface are then received by a light sensor.

Interference occurs when two light beams collide, which could cause them to either strengthen or weaken, depending on the phase of the two light beams. Thus, by measuring the intensity of the combined light beams, the distance between the light sensor and multiple points on the target surface can be calculated through an algorithm. This can then be used to measure the dimensions of the structure or the alignment of layers.

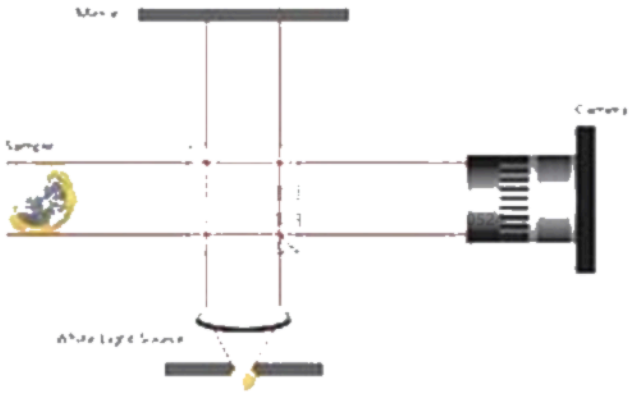
This business should continue to grow along with the capacity expansion for different advanced packaging architectures, e.g., CoWoS, wafer-level multi-chip module (WMCM), CoPoS. We estimate that metrology will account for mid single digit % of Chroma's total revenue in 2026.

Exhibit 39: Concept of light interference



Source: Keyence

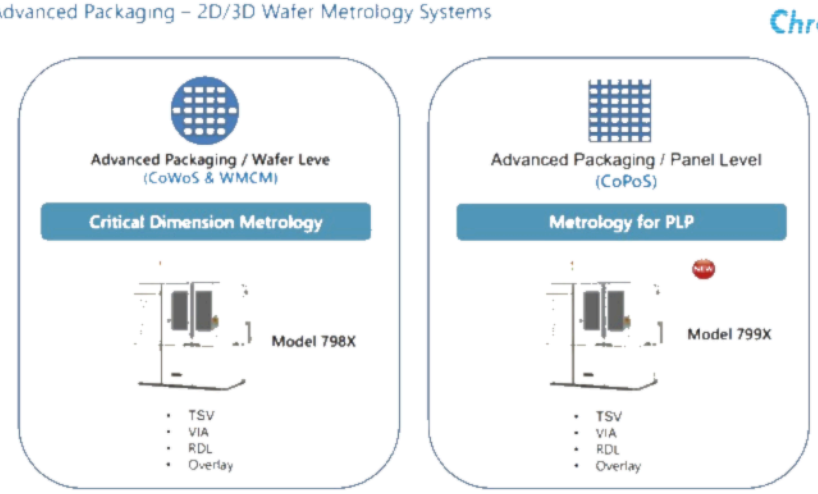
Exhibit 40: Setup of interferometer



Source: Wikipedia

Exhibit 41:

Metrology equipment offerings from Chroma



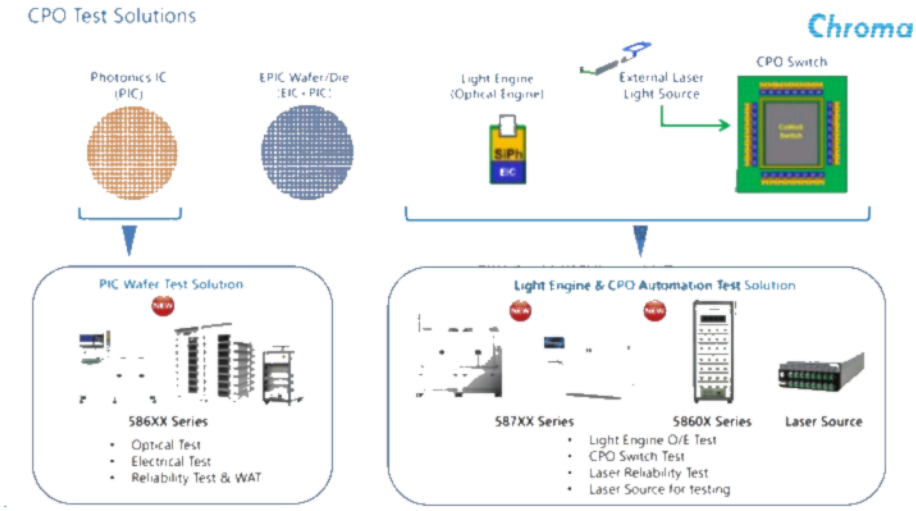
Source: Chroma

Emerging contribution from CPO testing equipment

For CPO testing equipment, Chroma can leverage its accumulated experience and technology in electrical IC and photonics IC testing. It has already been qualified for insertion 3 and insertion 4o testing tools. We think Chroma should ship some tools in 2H26 for the pilot line and it has already received the first batch of orders for the MP line for shipment in 2027.

We estimate that photonics testing equipment will account for 7% of its total revenue in 2026, and the contribution could be higher if CPO continues to penetrate more data center interconnects.

Exhibit 42: CPO testing equipment offerings from Chroma



Source: Chroma.

Greater China Hardware (covered by Andy Meng)

Largan (3008.TW): CPO/FAU opportunity continues to progress

We remain positive on Largan's CPO/FAU opportunity given the company's strong track record in high-precision manufacturing relative to most Taiwanese peers. For our FAU assumptions, we assume an ASP of US$100 and expect Largan's market share to increase from 5% in 2027 to 40% in 2028, with net margins of 10% and 30%, respectively. This implies FAU earnings contribution of approximately US$4mn in 2027 and US$579mn in 2028. In its recent 3Q26 results call, Largan indicated that its first FA project has passed customer verification and that it is expanding from FA into FAU, including coupling and potential FAU-to-carrier assembly, with a dedicated new facility expected to support mass production from around mid-2027, reinforcing our long-term positive view on the company's FAU/CPO opportunities.

Genius (3406.TW): CPO/FAU component opportunity

We expect Genius to participate primarily in FAU components rather than the overall FAU solutions. Accordingly, we assume that its addressable component TAM represents approximately 15% of total FAU TAM. We assume Genius's market share increases from 5% in 2027 to 30% in 2028, with net margins of 10% and 25%, respectively, implying FAU component earnings contribution of approximately US$1mn in 2027 and US$54mn in 2028.

Japan – Semiconductors (covered by Suzune Tamura)

Advantest (6857.T): ATE growth to outpace the broader SPE market; reiterating Top Pick and OW

Advantest has expressed confidence in its strong positioning in CPO testing. The company expects its CPO-related revenue to double in 2027 and more than double again in 2028.

Its competitor Teradyne (covered by Shane Brett) expects the CPO-related tester TAM to grow from $100mn in 2026 to $300-700mn in 2028, and further to $1bn by 2030, as CPO adoption broadens across scale-up applications in AI computing clusters. Based on Advantest's outlook as of the June quarter, the SoC tester TAM is expected to reach around $11bn in 2026, suggesting that the CPO tester market remains relatively small for now. Even without CPO, we believe the ATE market can outgrow the broader SPE market over the next few years, supported by increasing volumes of AI ASICs and CPUs, as well as higher test intensity across GPUs, ASICs and CPUs. Once scale-up demand ramps, we expect CPO to emerge as the next growth driver for ATE demand.

Advantest's V93000 has a very large installed base across foundries and OSATs. We believe Advantest's competitive advantage lies in the ability of customers and the broader supply-chain ecosystem to extend the existing V93k platform to CPO testing. Fabless customers are already familiar with the V93k platform, including functionality, programming environment and workflows, whereas adopting a different platform would require them to develop entirely new test programs. From a production-site perspective, investment risk can also be reduced by deploying CPO testing capabilities on the existing V93k platform, as customers retain the flexibility to repurpose the platform for testing other devices if needed.

Allring: Estimate Revisions and Quarterly Financials

We lift our EPS estimates 21% for 2026, 21% for 2027, and 27% for 2028: Our 2026 revenue and EPS estimate changes mostly reflect better-than-expected 2Q26 performance and non-op gain. We lift our 2027 and 2028 revenue estimates to reflect ongoing advanced packaging capacity opportunities, including oS capacity expansion for Xintec (3374.TWO; Not Covered), for which we now expect 10kwpm by 2027 and 40kwpm by 2028. We expect the content value per kwpm of oS build could be similar to TSMC of NT$130mn given the same equipment used. Besides, we also bake in some contribution from a US customer, which could start in 2027.

Exhibit 43: AllRing: Estimate revisions

NTD mn	New '2026	Old '2026E	Diff.	New '2027e	Old '2027E	Diff.	New '2028e	Old '2028E	Diff.
Net sales	10,055	9,405	7%	18,000	14,955	20%	20,600	16,655	24%
Gross profit	5,282	4,877	8%	9,350	7,766	20%	10,824	8,749	24%
Operating profit	3,281	2,739	20%	5,312	4,385	21%	6,315	4,944	28%
Pretax Income	3,547	2,930	21%	5,576	4,561	22%	6,579	5,145	28%
Net income	3,002	2,454	22%	4,684	3,831	22%	5,526	4,322	28%
EPS for consensus	**30.89**	**25.48**	**21%**	**48.14**	**39.79**	**21%**	**56.81**	**44.89**	**27%**
Margins									
Gross margin	52.5%	51.9%		51.9%	51.9%		52.5%	52.5%	
Operating margin	32.6%	29.1%		29.5%	29.3%		30.7%	29.7%	
Pretax margin	35.3%	31.2%		31.0%	30.5%		31.9%	30.9%	
Net margin	29.9%	26.1%		26.0%	25.6%		26.8%	25.9%	
Opex %	19.9%	22.7%		22.4%	22.6%		21.9%	22.8%	

Source: Morgan Stanley Research (e) estimates

Exhibit 44: AllRing: Quarterly financials

(NT$ mn)	1Q26	2Q26	3Q26E	4Q26E	1Q27E	2Q27E	3Q27E	4Q27E	2024	2025E	2026E	2027E	2028E
Total revenues	1,411	2,355	3,203	3,086	3,272	4,085	4,950	5,694	5,535	5,366	10,055	18,000	20,600
Q/Q Change	*59%*	*67%*	*36%*	*-4%*	*6%*	*25%*	*21%*	*15%*	*359%*	*-3%*	*87%*	*79%*	*14%*
Y/Y Change	*13%*	*55%*	*88%*	*248%*	*132%*	*73%*	*55%*	*84%*	*359%*	*-3%*	*87%*	*79%*	*14%*
Cost of Sales	681	1,065	1,541	1,486	1,573	1,963	2,379	2,736	2,818	2,453	4,773	8,650	9,776
Percent of Revenues	*48%*	*45%*	*48%*	*48%*	*48%*	*48%*	*48%*	*48%*	*51%*	*46%*	*47%*	*48%*	*47%*
Gross Profit	731	1,290	1,661	1,601	1,699	2,122	2,571	2,958	2,717	2,913	5,282	9,350	10,824
Gross Margin	*52%*	*55%*	*52%*	*52%*	*52%*	*52%*	*52%*	*52%*	*49%*	*54%*	*53%*	*52%*	*53%*
Total Opex	403	507	552	539	923	931	1,043	1,140	1,284	1,304	2,001	4,038	4,509
Percent of Revenues	*29%*	*22%*	*17%*	*17%*	*28%*	*23%*	*21%*	*20%*	*23%*	*24%*	*20%*	*22%*	*22%*
R&D	192	265	210	210	400	400	400	400	775	767	877	1,600	1,625
Percent of Revenues	*14%*	*11%*	*7%*	*7%*	*12%*	*10%*	*8%*	*7%*	*14%*	*14%*	*9%*	*9%*	*8%*
General & Adm Exp.	112	110	150	144	262	327	396	455	276	275	516	1,440	1,648
Percent of Revenues	*8%*	*5%*	*5%*	*5%*	*8%*	*8%*	*8%*	*8%*	*5%*	*5%*	*5%*	*8%*	*8%*
Selling Expenses	99	132	192	185	262	204	247	285	233	262	608	998	1,236
Percent of Revenues	*7%*	*6%*	*6%*	*6%*	*8%*	*5%*	*5%*	*5%*	*4%*	*5%*	*6%*	*6%*	*6%*
Operating Income	327	783	1,109	1,061	775	1,191	1,528	1,818	1,433	1,610	3,281	5,312	6,315
Operating Margin	*23%*	*33%*	*35%*	*34%*	*24%*	*29%*	*31%*	*32%*	*26%*	*30%*	*33%*	*30%*	*31%*
Total Non-operating Income (	-60	-174	-16	-16	-66	-66	-66	-66	-133	-12	-14	-14	0
Profit Before Taxes	387	957	1,126	1,077	841	1,257	1,594	1,884	1,566	1,813	3,547	5,576	6,579
Percent of Revenues	*27%*	*41%*	*35%*	*35%*	*26%*	*31%*	*32%*	*33%*	*28%*	*34%*	*35%*	*31%*	*32%*
Taxes	67	141	180	172	135	201	255	301	255	316	561	892	1,053
Tax Rate	*17%*	*15%*	*16%*	*16%*	*16%*	*16%*	*16%*	*16%*	*16%*	*17%*	*16%*	*16%*	*16%*
Total Net Income to Parent	325	827	945	905	707	1,056	1,339	1,582	1,311	1,485	3,002	4,684	5,526
Percent of Revenues	*23%*	*35%*	*30%*	*29%*	*22%*	*26%*	*27%*	*28%*	*24%*	*28%*	*30%*	*26%*	*27%*
EPS (NT$)	3.37	8.50	9.72	9.30	7.27	10.85	13.76	16.27	15.25	15.46	30.89	48.14	56.81
Change vs Year Ago	*-6%*	*104%*	*123%*	*177%*	*116%*	*28%*	*42%*	*75%*	*794%*	*1%*	*100%*	*56%*	*18%*
EPS for consensus (NT$)	3.37	8.50	9.72	9.30	7.27	10.85	13.76	16.27	15.25	15.46	30.89	48.14	56.81
Change vs Year Ago	*-6%*	*104%*	*123%*	*177%*	*116%*	*28%*	*42%*	*75%*	*794%*	*1%*	*100%*	*56%*	*18%*

Source: Company data, Morgan Stanley Research (E) estimates

AllRing: Valuation Methodology

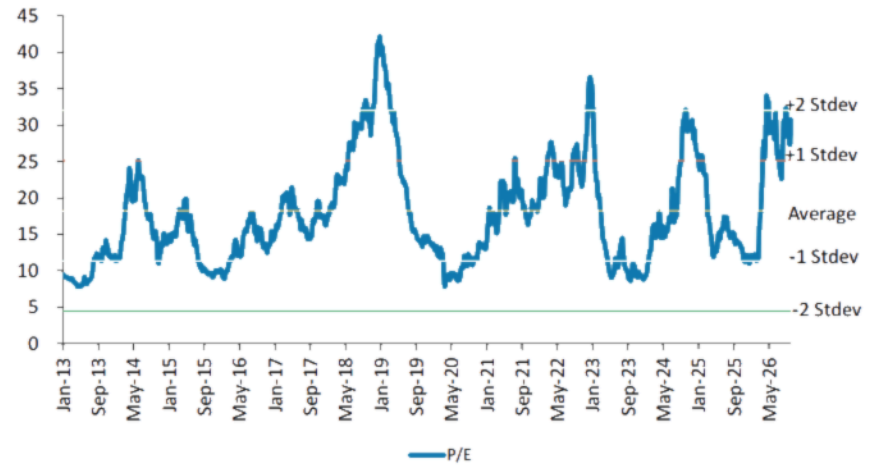
We raise our RI-based price target (base case scenario value) from NT$1,580 to NT $2,000, reflecting our estimate changes for 2027 and 2028. Our key assumptions are unchanged, including a cost of equity (CoE) at 8%, derived from a risk-free rate of 2.0%, beta of 1.0 and market risk premium of 6%; intermediate growth rate of 16%; and terminal growth rate of 4.5%.

Exhibit 45: AllRing: RI model

NT$ million	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E
Total Equity	9,700	12,923	16,125	18,349	20,930	23,923	27,395	31,423	36,095	41,515	47,802	55,095
Net Profit	2,954	4,684	5,526	6,411	7,436	8,626	10,006	11,607	13,465	15,619	18,118	21,017
ROAE	**34.4%**	**41.4%**	**38.1%**	**37.2%**	**37.9%**	**38.5%**	**39.0%**	**39.5%**	**39.9%**	**40.2%**	**40.6%**	**40.9%**
Residual Income	1,975	3,240	3,883	4,707	5,480	6,376	7,416	8,621	10,019	11,641	13,522	15,703
Spread	**26.4%**	**33.4%**	**30.1%**	**29.2%**	**29.9%**	**30.5%**	**31.0%**	**31.5%**	**31.9%**	**32.2%**	**32.6%**	**32.9%**
Ending Equity Capital	9,700											
PV of Forecast Period	45,636											
PV of Continuing Value	138,737											
Equity Value	**194,073**											
No. of Shares	97											
Price Target	**2,000**											

Source: Company data, Morgan Stanley Research (E) estimates

Exhibit 46: AllRing: NTM P/E



Source: Company data, FactSet, Morgan Stanley Research estimates

Risk Reward – AllRing Tech Co. (6187.TWO)

CPO, SoIC, and CoPoS Help to Extend Revenue Momentum; OW

PRICE TARGET NT$2,000.00

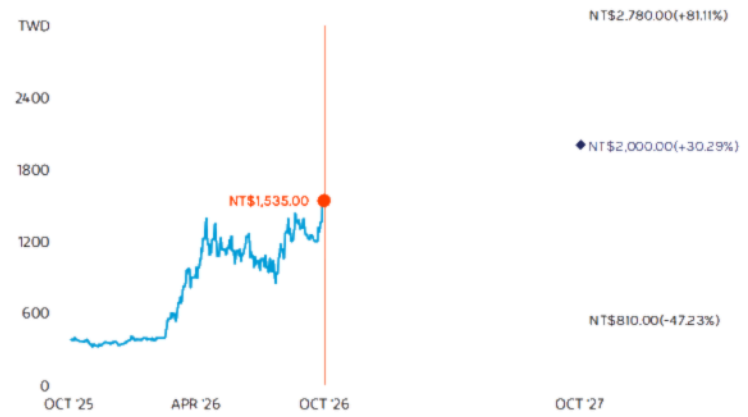
Base case, residual income model. Our key assumptions are:

- Cost of equity (CoE) of 8%, derived from a risk-free rate of 2.0%, beta of 1.0, and a market risk premium of 6.0%.
- Intermediate growth rate of 16%.
- Cash dividend payout of 65%
- Terminal growth rate of 4.5%.

Consensus Price Target Distribution NT$1,450.00 NT$2,000.00 MS PT

Mean Morgan Stanley Estimates

RISK REWARD CHART

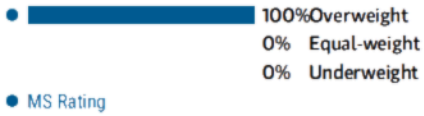


Key: Historical Stock Performance Current Stock Price Price Target

OVERWEIGHT THESIS

- NVIDIA's next-generation GPU Rubin will stick with graphene for heat sink attachment, reducing concerns about competition for Allring.
- We expect AllRing to be a key beneficiary of the multi-year advanced packaging trend, including CoPoS and SoIC, but large-scale revenue contributions will likely take time.
- It is the sole WoW (Wafer-on-Wafer) dispenser supplier for SoIC, which we expect to be the next growth driver, contributing at least 2% of total revenue in 2026 and 4% in 2027.
- Our implied 2027e target P/E is 40x, similar to its SoIC peer and lower than CPO peers. We expect new advanced packaging opportunities including CPO, CoWoP, and CoPoS to benefit the company in the long run.

Consensus Rating Distribution



Risk Reward Themes

Secular Growth:	*Positive*
Technology Diffusion:	*Positive*

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BULL CASE NT$2,780.00

58x 2027e EPS

We assume: 1) 60% revenue CAGR over 2025-28, thanks to stronger-than-expected capacity expansion plans for TSMC's CoWoS, CPO and SoIC; 2) gross margin expands to more than 55% in 2025-28, due to stronger-than-expected operating leverage resulting from the equipment production outsourcing strategy; 3) new product launches exceed expectations and AllRing increases its market share in other processes such as "CoW."

BASE CASE NT$2,000.00

42x 2027e EPS

We expect: 1) 46% revenue CAGR in 2025-28e after strong CoWoS capacity expansion for TSMC in 2024-25; 2) gross margin to be maintained at 48-53% from 2024-28 thanks to high operating leverage resulting from the equipment production outsourcing strategy; and 3) with new equipment launches, we expect AllRing to expand its market share in other processes. CPO, SoIC and other applications continue to bear fruit.

BEAR CASE NT$810.00

16x 2027e EPS

We assume: 1) -30% revenue CAGR in 2024-28 due to slower-than-expected CoWoS capacity expansion plans by TSMC; 2) gross margin falls below 40% owing to the high bargaining power of its customers; 3) market share loss in "WoS" process amid rising peer competition.

Risk Reward – AllRing Tech Co. (6187.TWO)

KEY EARNINGS INPUTS

Drivers	Dec 2025	Dec 2026e	Dec 2027e	Dec 2028e
Semi revenue (NT$, mn)	5,215	9,925	17,917	20,508
Passive revenue (NT$, mn)	52	65	43	47

INVESTMENT DRIVERS

- CoWoS capacity expansion from TSMC
- New technology migration such as SoIC and silicon photonics
- Strong operating leverage, given equipment production outsourcing strategy

GLOBAL REVENUE EXPOSURE



here

MS ALPHA MODELS

3/5 MOST

3 Month Horizon

RISKS TO PT/RATING

RISKS TO UPSIDE

- Stronger-than-expected CoWoS capacity expansion
- Faster-than-expected adoption of silicon photonics
- Market share gains from peers, led by continuous R&D and China's localization trend

RISKS TO DOWNSIDE

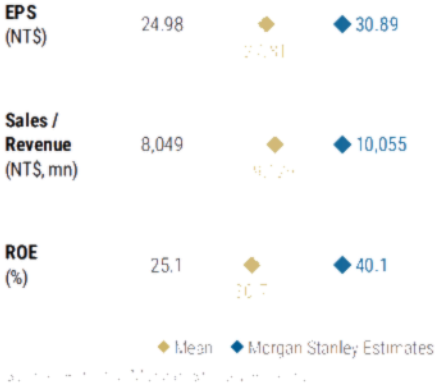
- Slowdown in CoWoS capacity expansion
- Allring's "WoS" market share declining
- Slowdown in technology migration such as SoIC and silicon photonics adoption

OWNERSHIP POSITIONING

Inst. Owners, % Active 78.5%

MS ESTIMATES VS. CONSENSUS

FY Dec 2026e



AllRing: Financial Summary

Income Statement

NT$mn (Years End Dec)	2024	2025	2026E	2027E	2028E
Net sales	5,535	5,366	10,055	18,000	20,600
COGS	2,818	2,453	4,773	8,650	9,776
Gross profit	2,717	2,913	5,282	9,350	10,824
Operating expenses	1,284	1,304	2,001	4,038	4,509
Operating income	**1,433**	**1,610**	**3,281**	**5,312**	**6,315**
Non-operating income	(133)	(203)	(266)	(264)	(264)
Pre-tax income	1,566	1,813	3,547	5,576	6,579
Income tax	255	316	561	892	1,053
Minority Interest	1,311	1,496	2,986	4,684	5,526
Reported net income	**1,311**	**1,485**	**3,002**	**4,684**	**5,526**
Adj wtd avg shrs(m)	90	96	97	97	97
Reported EPS (NT$)	**15.25**	**15.46**	**30.89**	**48.14**	**56.81**
EPS for consensus (NT$)	**15.25**	**15.46**	**30.89**	**48.14**	**56.81**

Balance Sheet

NT$mn (Years End Dec)	2024	2025	2026E	2027E	2028E
Cash	3,536	4,182	5,540	6,991	9,564
Mkt Securities	0	53	0	0	0
AR/NR	1,552	806	1,905	3,411	3,903
Inventory	949	1,114	1,719	3,116	3,522
Other	293	180	180	180	180
Current Assets	**6,330**	**6,335**	**9,345**	**13,698**	**17,169**
Long-term investments	36	0	0	0	0
Fixed assets	1,298	1,879	1,979	2,079	2,179
Deffered assets	50	76	76	76	76
Other assets	1,056	1,288	1,288	1,288	1,288
Total Assets	**8,796**	**9,609**	**12,719**	**17,172**	**20,743**
S/T borrowings	0	0	0	0	0
AP/NP	888	564	1,358	2,461	2,781
Other ST liabilities	865	943	943	943	943
LT debt	290	339	339	339	339
Other LT liabilities	131	142	142	142	142
Total Liabilities	**2,279**	**2,121**	**2,971**	**4,225**	**4,594**
Common shares	969	971	971	971	971
Additional capital	2,919	3,017	3,017	3,017	3,017
Retained earning	2,347	2,941	5,200	8,383	11,567
Other shareholders' equity	282	559	559	576	593
Total Equity	**6,517**	**7,488**	**9,747**	**12,947**	**16,149**
Total Liab. & Shrhldr's Equity	**8,796**	**9,609**	**12,719**	**17,172**	**20,743**

E = Morgan Stanley Research Estimates

Source: Morgan Stanley Research, Company Data

Cash Flow Statement

NT$mn (Years End Dec)	2024	2025	2026E	2027E	2028E
Cashflow from Operations	**1,079**	**1,958**	**2,216**	**3,103**	**5,066**
Net profits	1,311	1,485	3,002	4,684	5,526
Depreciation	47	59	59	59	59
Working Capital Change	(130)	476	(854)	(1,649)	(529)
Other adjustments	(157)	(71)	0	0	0
Cashflow from Investing	**(359)**	**(666)**	**(98)**	**(151)**	**(151)**
Capex	(372)	(581)	(100)	(100)	(100)
Change of LT Investment	(36)	36	0	0	0
Other adjustments	50	(68)	(51)	(51)	(51)
Cashflow from financing	**1,851**	**(645)**	**(743)**	**(1,501)**	**(2,342)**
Increase in L/T debt	(563)	49	0	0	0
Increase in S/T debt	0	0	0	0	0
Cash Dividend Paid	(131)	(980)	(743)	(1,501)	(2,342)
Net change in cash	**2,601**	**646**	**1,358**	**1,451**	**2,573**

Financial Ratios

	2024	2025	2026E	2027E	2028E
Growth(%)					
Turnover	359.2	-3.0	87.4	79.0	14.4
Operating profits	1623.8	12.3	103.8	61.9	18.9
Pretax profits	873.5	15.8	95.7	57.2	18.0
Net profits	848.5	13.3	102.1	56.0	18.0
EPS	793.9	1.4	99.8	55.9	18.0
Margins (%)					
Gross Margin	49.1	54.3	52.5	51.9	52.5
Operating Margin	25.9	30.0	32.6	29.5	30.7
Pretax Margin	28.3	33.8	35.3	31.0	31.9
Net Profit	23.7	27.7	29.9	26.0	26.8
Return (%)					
ROAE	29.1	21.2	34.8	41.3	38.0
ROAA	19.7	16.1	26.9	31.3	29.2
Gearing (%)					
Net Debt/Equity	(49.8)	(51.3)	(53.4)	(51.4)	(57.1)
Liabilities/Equity	35.0	28.3	30.5	32.6	28.4
Ratios (X)					
Current ratio	3.6	4.2	4.1	4.0	4.6
Quick ratio	2.9	3.3	3.2	3.1	3.6
Others					
AR/NR Turnover (days)	180	69	69	69	69
Inventory Turnover (days)	563	131	131	131	131
AP Turnover (days)	337	104	104	104	104
Cash Conversion (days)	406	97	97	97	97

FOCI: Estimate Revisions and Quarterly Financials

We narrow our loss estimate for 2026 but make significant cuts to 2027e and 2028e earnings: Weaker-than-expected 1Q26 and 2Q26 results were mainly due to ongoing capacity transition from the Hsinchu fab to the new fab in Thailand as the company prioritizes its SiPh/CPO development. The SiPh/CPO new capacity line will also take some time, and pre-mass production preparation such as destructive testing conducted could also affect its gross margin in 2026. Hence our 2026 earnings estimate is still a loss.

We make more significant cuts to our 2027-28 revenue and EPS assumptions to reflect less CPO market share from its largest customer given fierce competition. We now expect 8-15% (vs. our previous expectation of 35%). Also, because we expect the company to continue expand the capacity, we see ongoing margin dilution from the new production ramp.

Exhibit 47: FOCI: Estimate revisions

NT$ mn	New '26E	Old '26E	Diff.	New '27E	Old '27E	Diff.	New '28E	Old '28E	Diff.
Net sales	2,100	1,985	6%	6,791	8,694	-22%	19,914	23,559	-15%
Gross profit	285	370	-23%	2,345	3,194	-27%	7,510	9,044	-17%
Operating profit	(194)	(129)		1,363	2,184	-38%	4,968	6,443	-23%
Pretax Income	(47)	(58)		1,428	2,214	-36%	4,993	6,454	-23%
Net income	(39)	(45)		1,157	1,794	-36%	4,044	5,228	-23%
Reported EPS (NT$)	**(0.34)**	**(0.41)**		**10.18**	**16.36**	**-38%**	**35.59**	**47.68**	**-25%**
Margins									
Gross margin	13.6%	18.7%		34.5%	36.7%		37.7%	38.4%	
Operating margin	-9.3%	-6.5%		20.1%	25.1%		24.9%	27.3%	
Pretax margin	-2.2%	-2.9%		21.0%	25.5%		25.1%	27.4%	
Net margin	-1.8%	-2.3%		17.0%	20.6%		20.3%	22.2%	

Source: Company data, Morgan Stanley Research (E) estimates

Exhibit 48: FOCI: Quarterly financials

NT$ in million	1Q26	2Q26	3Q26E	4Q26E	1Q27E	2Q27E	3Q27E	4Q27E	1Q28E	2Q28E	3Q28E	4Q28E	2024	2025	2026E	2027E	2028E
Total Revenues	382	429	600	796	956	1,250	1,741	2,844	3,746	4,444	5,278	6,447	1,364	1,892	2,100	6,791	19,914
Sequential Change	*-2.2%*	*12.4%*	*39.7%*	*32.8%*	*20.0%*	*30.7%*	*39.3%*	*63.4%*	*31.7%*	*18.7%*	*18.8%*	*22.2%*					
Change vs Year Ago	*-6.7%*	*-26.5%*	*18.1%*	*103.8%*	*150.3%*	*191.2%*	*190.4%*	*257.1%*	*291.8%*	*255.6%*	*203.1%*	*126.7%*	*7.2%*	*38.7%*	*11.0%*	*223.4%*	*193.3%*
Cost of Sales	375	428	511	611	668	852	1,143	1,783	2,377	2,793	3,281	3,954	1,185	1,537	1,815	4,446	12,404
Percent of Revenues	*98%*	*100%*	*85%*	*77%*	*70%*	*68%*	*66%*	*63%*	*63%*	*63%*	*62%*	*61%*	*87%*	*81%*	*86%*	*65%*	*62%*
Gross Profit	7	1	88	185	288	398	598	1,061	1,369	1,651	1,997	2,493	179	355	285	2,345	7,510
Percent of Revenues	*1.9%*	*0.2%*	*14.7%*	*23.3%*	*30.1%*	*31.8%*	*34.3%*	*37.3%*	*36.5%*	*37.2%*	*37.8%*	*38.7%*	*13.1%*	*18.8%*	*13.6%*	*34.5%*	*37.7%*
Incremental Margin	*NM*	*-13%*	*51%*	*49%*	*64%*	*37%*	*41%*	*42%*	*34%*	*40%*	*41%*	*42%*	*1%*	*33%*	*-34%*	*44%*	*39%*
Total Opex	163	93	105	118	164	229	246	343	436	547	770	790	273	354	479	982	2,542
Percent of Revenues	*42.8%*	*21.7%*	*17.5%*	*14.8%*	*17.2%*	*18.3%*	*14.1%*	*12.0%*	*11.6%*	*12.3%*	*14.6%*	*12.2%*	*20.0%*	*18.7%*	*22.8%*	*14.5%*	*12.8%*
R&D	72	45	50	55	100	150	150	200	260	310	460	460	147	212	221	600	1,490
Percent of Revenues	*18.8%*	*10.4%*	*8.3%*	*6.9%*	*10.5%*	*12.0%*	*8.6%*	*7.0%*	*6.9%*	*7.0%*	*8.7%*	*7.1%*	*10.8%*	*11.2%*	*10.5%*	*8.8%*	*7.5%*
General & administrative	73	35	37	39	50	60	70	100	120	170	220	220	96	110	185	280	730
Percent of Revenues	*19.1%*	*8.3%*	*6.3%*	*5.0%*	*5.2%*	*4.8%*	*4.0%*	*3.5%*	*3.2%*	*3.8%*	*4.2%*	*3.4%*	*7.1%*	*5.8%*	*8.8%*	*4.1%*	*3.7%*
Selling & marketing	19	13	18	24	14	19	26	43	56	67	90	110	29	32	73	102	322
Percent of Revenues	*4.9%*	*3.0%*	*3.0%*	*3.0%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.5%*	*1.7%*	*1.7%*	*2.2%*	*1.7%*	*3.5%*	*1.5%*	*1.6%*
Operating Income	(156)	(92)	(17)	67	124	169	352	719	932	1,105	1,227	1,704	(93)	0	(194)	1,363	4,968
Percent of Revenues	*-40.9%*	*-21.4%*	*-2.8%*	*8.5%*	*12.9%*	*13.5%*	*20.2%*	*25.3%*	*24.9%*	*24.9%*	*23.2%*	*26.4%*	*-6.8%*	*0.0%*	*-9.3%*	*20.1%*	*24.9%*
Change vs Year Ago	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*	*n.a.*
Total Non-operating Income(Loss)	22	64	31	31	16	16	16	16	6	6	6	6	37	22	148	65	25
Profit Before Taxes	(135)	(28)	14	99	140	185	368	735	939	1,111	1,233	1,710	(57)	23	(47)	1,428	4,993
Percent of Revenues	*-35%*	*-7%*	*2%*	*12%*	*15%*	*15%*	*21%*	*26%*	*25%*	*25%*	*23%*	*27%*	*-4%*	*1%*	*-2%*	*21%*	*25%*
Taxes	(28)	(3)	3	20	27	35	70	140	178	211	234	325	(8)	7	(8)	271	949
Tax Rate	*20.5%*	*11.2%*	*20.0%*	*20.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*14.6%*	*29.0%*	*17.3%*	*19.0%*	*19.0%*
Reported Income (TW GAAP)	**(107)**	**(25)**	**11**	**79**	**113**	**150**	**298**	**595**	**760**	**900**	**999**	**1,385**	**(48)**	**16**	**(39)**	**1,157**	**4,044**
Percent of Revenues	*-28%*	*-6%*	*2%*	*10%*	*12%*	*12%*	*17%*	*21%*	*20%*	*20%*	*19%*	*21%*	*-4%*	*1%*	*-2%*	*17%*	*20%*
Change vs Year Ago	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*NM*	*NM*	*NM*	*NM*	*250%*
Reported EPS (NT$, TW GAAP)	**(0.98)**	**(0.22)**	**0.10**	**0.69**	**1.00**	**1.32**	**2.62**	**5.24**	**6.69**	**7.92**	**8.79**	**12.19**	**(0.47)**	**0.16**	**(0.34)**	**10.18**	**35.59**
Change vs Year Ago	*-9215%*	*-237%*	*-49%*	*-422%*	*n.a.*	*n.a.*	*2497%*	*655%*	*571%*	*499%*	*235%*	*133%*	*NM*	*NM*	*NM*	*NM*	*250%*

Source: Company data, Morgan Stanley Research (E) estimates

FOCI: Valuation Methodology

Downgrade from OW to EW but cut our price target (base case scenario value) only 3%, to NT$688: Largely offsetting the cuts to our 2027/2028 EPS forecasts, we update the our beta assumption.

We keep our medium-term growth rate at 16%, in line with Asian optics peers (e.g., Landmark), to reflect rapid development in CPO and silicon-photonics technology. We also update the cost of equity from 12.9% to 11.6% (risk-free rate 2.0%, risk premium 6.9%, beta updated from 1.6 to 1.4 – last 52 weeks beta). We maintain our other assumptions: payout ratio of 61%, and terminal growth rate of 4%.

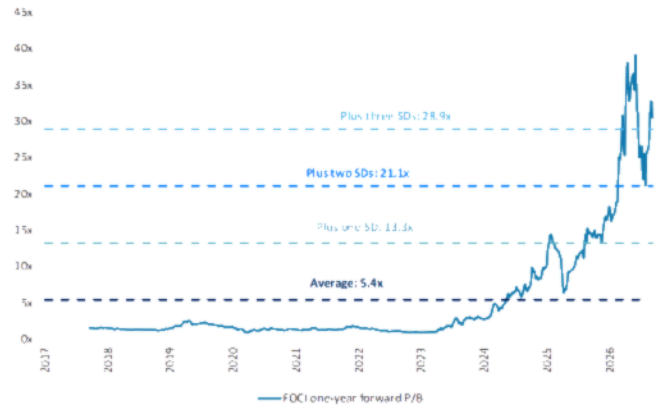
Our bull and bear case values also fall 3% each.

Exhibit 49: FOCI: RI base

NT$million	2026E	2027E	2028E	2029E	2030E	2031E	2032E	2033E	2034E	2035E	2036E	2037E
Total Equity	2,427	3,471	7,380	9,494	11,947	14,790	18,087	21,910	26,343	31,482	37,442	44,352
Net Profit	(39)	1,157	4,044	4,690	5,438	6,305	7,310	8,476	9,828	11,396	13,214	15,321
ROAE	NM	39.2%	74.5%	55.6%	50.7%	47.2%	44.5%	42.4%	40.7%	39.4%	38.3%	37.5%
Residual Income		671	2,185	3,246	3,715	4,250	4,863	5,570	7,044	9,174	10,626	12,308
Spread		27.6%	63.0%	44.0%	39.1%	35.6%	32.9%	30.8%	29.1%	27.8%	26.8%	25.9%
Ending Equity Capital	2,427											
PV of Forecast Period	24,546											
PV of Continuing Value	50,480											
Equity Value	77,453											
No. of Shares	113											
Projected Price	688											

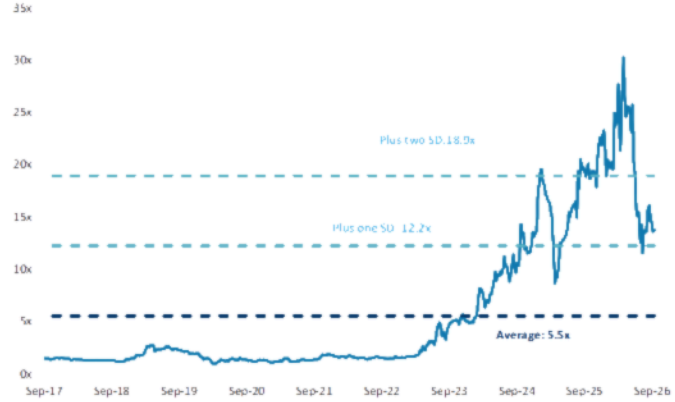
Source: Company data, Morgan Stanley Research (E) estimates

Exhibit 50: FOCI: P/B



Source: Company data, Factset, Morgan Stanley Research estimates

Exhibit 51: FOCI: P/S



Source: Company data, Factset, Morgan Stanley Research estimates

Risk Reward – FOCI Fiber Optic Communications Inc (3363.TWO)

FAU market is becoming crowded; EW

PRICE TARGET NT$688.00

Base case, residual income model. Key assumptions: cost of equity of 11.6% (risk-free rate 2.0%, risk premium 6.9%, beta 1.4), a payout ratio of 61%, a medium-term growth rate of 16%, and a terminal growth rate of 4.0%.

RISK REWARD CHART



EQUAL-WEIGHT THESIS

- Co-packaged optics (CPO) are an advanced silicon photonics (SiPh) method that integrates optics and silicon on a single packaged substrate, to reduce signal loss, power consumption, and cost.
- However, the FAU market is becoming crowded; We count at least 10 companies with CPO FAU products shipping, sampling or in pilot production.
- Given its close partnership with TSMC, we think FOCI is still positioned to provide CPO's fiber array units (FAU) and related services, leveraging its ReLFACon technology.
- At our price target, FOCI would trade at 68x 2027e P/E, but only 19x 2028e, which we think is fair for now.

Risk Reward Themes

Disruption:	*Positive*
Secular Growth:	*Negative*
Technology Diffusion:	*Positive*

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BULL CASE NT$895.00

88x 2027e EPS

We assume: 1) 200% revenue CAGR, 2025-28e, from stronger-than-expected CPO development; 2) faster-than-expected CPO introduction; 3) gross margin improving to over 50% in 2027e thanks to scale effects and the company's technology competitiveness; and 4) >600% EPS CAGR, 2025-28e.

BASE CASE NT$688.00

64x 2027e P/E

We project: 1) >120% revenue CAGR, 2025-28e, on fast CPO development; 2) gross margin improves to over 37% in 2028e thanks to scale effects and the company's technology competitiveness; 3) >500% EPS CAGR, 2025-28e.

BEAR CASE NT$320.00

31x 2027e P/E

We assume: 1) 50% revenue CAGR, 2023-27e, given slower-than-expected CPO development; 2) slower-than-expected CPO introduction; and 3) gross margin falling below 10% in 2027 due to the high bargaining power of customers.

Risk Reward – FOCI Fiber Optic Communications Inc (3363.TWO)

KEY EARNINGS INPUTS

Drivers	Dec 2025	Dec 2026e	Dec 2027e	Dec 2028e
Revenue from computing segment (NT$, mn)	1,198	1,325	1,594	1,764
Revenue from communication segment (NT$, mn)	326	270	417	452
Revenue from battery segment (NT$, mn)	109	473	4,745	17,655

INVESTMENT DRIVERS

- Silicon photonics and CPO

GLOBAL REVENUE EXPOSURE



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RISKS TO PT/RATING

RISKS TO UPSIDE

- Faster-than-expected CPO introduction
- Increased geopolitical tensions
- Significant AI/cloud capex increase

RISKS TO DOWNSIDE

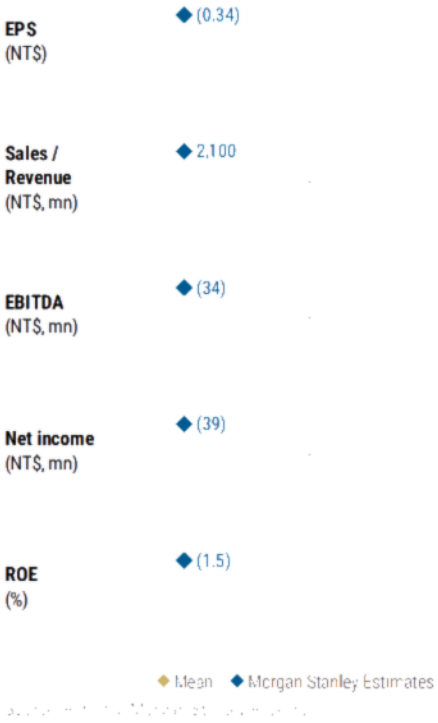
- Slower-than-expected CPO introduction
- Easing geopolitical tensions
- Significant AI/cloud capex cuts

OWNERSHIP POSITIONING

Inst. Owners, % Active 76.2%

MS ESTIMATES VS. CONSENSUS

FY Dec 2026e



FOCI: Financial Summary

Exhibit 52: FOCI: Financial Summary

Income Statement

NT$mn (Years End Dec)	2024	2025	2026E	2027E	2028E
Net sales	1,364	1,892	2,100	6,791	19,914
COGS	(1,185)	(1,537)	(1,815)	(4,446)	(12,404)
Gross profit	179	355	285	2,345	7,510
Operating expenses	(273)	(354)	(479)	(982)	(2,542)
Operating income	**(93)**	**0**	**(194)**	**1,363**	**4,968**
Non-operating income	37	22	148	65	25
Pre-tax income	(57)	23	(47)	1,428	4,993
Income tax	(8)	7	(8)	271	949
Reported net income	**(48)**	**16**	**(39)**	**1,157**	**4,044**
Adj.wtd.avg.shrs(m)	88	88	113	114	114
Reported EPS (NT$)	**(0.47)**	**0.16**	**(0.34)**	**10.18**	**35.59**
Modelware EPS (NT$)	**(0.47)**	**0.16**	**(0.34)**	**10.18**	**35.59**

Balance Sheet

NT$mn (Years End Dec)	2024	NT$ 2,025	2026E	2027E	2028E
Cash	1,470	1,412	2,221	4,859	8,859
Mkt Securities	43	20	20	20	20
AR/NR	285	276	311	1,007	2,954
Inventory	288	409	411	1,007	2,811
Other	56	91	91	91	91
Current Assets	**2,141**	**2,207**	**3,055**	**6,984**	**14,734**
Long-term investments	0	0	0	0	0
Fixed assets	485	647	2,024	4,090	6,496
Deffered assets	51	56	56	56	56
Other assets	290	247	247	247	247
Total Assets	**2,967**	**3,157**	**5,381**	**11,376**	**21,533**
S/T borrowings	0	153	459	1,072	2,297
AP/NP	202	194	233	572	1,595
Other ST liabilities	146	175	175	175	175
LT debt	89	86	2,086	6,086	10,086
Other LT liabilities	0	0	0	0	0
Common shares	1,036	1,036	1,036	1,036	1,036
Total Liabilities	**437**	**608**	**2,954**	**7,905**	**14,153**
Additional capital	1,440	1,464	1,464	1,464	1,464
Retained earning	276	273	152	1,196	5,104
Other shareholders' equity	(222)	(225)	(225)	(225)	(225)
Total Equity	**2,531**	**2,549**	**2,427**	**3,471**	**7,380**
Total Liab. & Shrhldr's Equity	**2,967**	**3,157**	**5,381**	**11,376**	**21,533**

E = Morgan Stanley Research Estimates

Source: Morgan Stanley Research, Company Data

Cash Flow Statement

NT$mn (Years End Dec)	2024	2025	2026E	2027E	2028E
Cashflow from Operations	**70**	**(17)**	**125**	**444**	**1,680**
Net profits	(48)	16	(39)	1,157	4,044
Depreciation	100	107	161	241	362
Working Capital Change	(71)	(154)	2	(954)	(2,727)
Other adjustments	88	13	0	0	0
Cashflow from Investing	**19**	**(165)**	**(1,538)**	**(2,307)**	**(2,768)**
Capex	(55)	(55)	(1,538)	(2,307)	(2,768)
Change of LT Investment	170	43	0	0	0
Change of ST Investment	0	0	0	0	0
Other adjustments	(95)	(153)	0	0	0
Cashflow from financing	**453**	**122**	**2,223**	**4,500**	**5,089**
Increase in L/T debt	2	(3)	2,000	4,000	4,000
Increase in S/T debt	0	153	306	613	1,225
Cash Dividend Paid	(49)	0	(83)	(113)	(136)
Issuance of stock	522	0	0	0	0
Other adjustments	(21)	(28)	0	0	0
Exchange rate adjustment	15	3	0	0	0
Net change in cash	**557**	**-58**	**810**	**2,637**	**4,000**

Financial Ratios

	2024	NT$ 2,025	2026E	2027E	2028E
Growth(%)					
Turnover	7.2	38.7	11.0	223.4	193.3
Operating profits	60.3	-100.5	-39953.9	-800.9	264.4
Pretax profits	-1091.4	-140.4	-304.1	-3167.2	249.6
Net profits	-500.3	-133.5	-337.8	-3104.4	249.6
EPS	-441.3	-133.4	-319.7	-3078.0	249.6
Margins (%)					
Gross Margin	13.1	18.8	13.6	34.5	37.7
Operating Margin	-6.8	0.0	-9.3	20.1	24.9
Pretax Margin	-4.1	1.2	-2.2	21.0	25.1
Net Profit	-3.5	0.9	-1.8	17.0	20.3
Return (%)					
ROAE	(2.1)	0.6	(1.5)	39.2	74.5
ROAA	(1.8)	0.5	(0.9)	13.8	24.6
Gearing (%)					
Net Debt/Equity	(58.1)	(49.4)	(72.6)	(109.1)	(88.9)
Liabilities/Equity	17.3	23.9	121.7	227.7	191.8
Ratios (X)					
Current ratio	6.2	4.2	3.5	3.8	3.6
Quick ratio	5.1	3.2	2.9	3.2	2.9
Others					
AR/NR Turnover (days)	75	54	54	54	54
Inventory Turnover (days)	82	83	83	83	83
AP Turnover (days)	49	47	47	47	47
Cash Conversion (days)	108	90	90	90	90

Source

ASE: Estimate Revisions and Quarterly Financials

We raise our EPS estimates 3% for 2026, 10% for 2027, and 23% for 2028: The increase mostly reflects margin expansion from better product mix, price hikes, and rising utilization rate, as well as the CPO business starting from 2027.

Exhibit 53: ASEH: Estimate revision summary

(NT$ mn)	New 2026e	Old 2026e	Diff.%	New 2027e	Old 2027e	Diff.%	New 2028e	Old 2028e	Diff.%
Net sales	847,748	836,892	1%	1,143,902	1,116,816	2%	1,540,230	1,453,498	6%
IC ATM	*542.924*	*531.497*	*2%*	*799.470*	*770.999*	*4%*	*1.182.358*	*1.091.940*	*8%*
EMS	*317.359*	*317.359*	*0%*	*374.536*	*374.536*	*0%*	*403.632*	*403.632*	*0%*
Gross profit	181,772	178,672	2%	291,850	273,076	7%	453,877	389,301	17%
Operating profit	102,211	99,620	3%	195,615	178,087	10%	333,891	272,064	23%
Pretax Income	103,703	100,699	3%	188,134	171,776	10%	326,409	265,753	23%
Net income	81,402	79,064	3%	145,490	132,817	10%	252,426	205,480	23%
Diluted EPS	**18.42**	**17.89**	**3%**	**32.92**	**30.05**	**10%**	**57.12**	**46.50**	**23%**
Margins									
Gross margin	21.4%	21.3%		25.5%	24.5%		29.5%	26.8%	
IC ATM GM	*28.2%*	*28.3%*		*32.2%*	*31.0%*		*35.2%*	*32.2%*	
Operating margin	12.1%	11.9%		17.1%	15.9%		21.7%	18.7%	
Pretax margin	12.2%	12.0%		16.4%	15.4%		21.2%	18.3%	
Net margin	9.6%	9.4%		12.7%	11.9%		16.4%	14.1%	

Source: Morgan Stanley Research (e) estimates

Exhibit 54: ASEH: Quarterly financials

(NT$ mn)	1Q26	2Q26e	3Q26e	4Q26e	1Q27e	2Q27e	3Q27e	4Q27e	2025	2026e	2027e	2028e
Total Revenues	**173,662**	**191,064**	**235,978**	**247,044**	**240,743**	**267,062**	**303,482**	**332,616**	**645,388**	**847,748**	**1,143,902**	**1,540,230**
Q/Q %	*-2.4%*	*10.0%*	*23.5%*	*4.7%*	*-2.6%*	*10.9%*	*13.6%*	*9.6%*				
Y/Y %	*17.2%*	*26.7%*	*40.0%*	*38.9%*	*38.6%*	*39.8%*	*28.6%*	*34.6%*	*8.4%*	*31.4%*	*34.9%*	*34.6%*
Cost of Sales	(138,812)	(150,945)	(185,083)	(191,136)	(182,774)	(200,231)	(225,581)	(243,467)	(531,195)	(665,976)	(852,053)	(1,086,353)
Percent of Revenues	*79.9%*	*79.0%*	*78.4%*	*77.4%*	*75.9%*	*75.0%*	*74.3%*	*73.2%*	*82.3%*	*78.6%*	*74.5%*	*70.5%*
Gross Profit	**34,850**	**40,118**	**50,895**	**55,908**	**57,969**	**66,831**	**77,901**	**89,148**	**114,193**	**181,772**	**291,850**	**453,877**
Gross Margin %	20.1%	21.0%	21.6%	22.6%	24.1%	25.0%	25.7%	26.8%	17.7%	21.4%	25.5%	29.5%
Total Operating Expense	**(17,318)**	**(19,024)**	**(21,327)**	**(21,893)**	**(21,753)**	**(23,114)**	**(24,939)**	**(26,429)**	**(63,437)**	**(79,561)**	**(96,235)**	**(119,986)**
Percent of Revenues	*10.0%*	*10.0%*	*9.0%*	*8.9%*	*9.0%*	*8.7%*	*8.2%*	*7.9%*	*9.8%*	*9.4%*	*8.4%*	*7.8%*
R&D	(9,210)	(10,229)	(10,379)	(10,529)	(10,679)	(10,829)	(10,979)	(11,129)	(32,851)	(40,346)	(43,615)	(46,055)
Percent of Revenues	*5.3%*	*5.4%*	*4.4%*	*4.3%*	*4.4%*	*4.1%*	*3.6%*	*3.3%*	*5.1%*	*4.8%*	*3.8%*	*3.0%*
Sales and Marketing	(1,996)	(2,287)	(2,689)	(2,717)	(2,648)	(2,938)	(3,338)	(3,659)	(7,405)	(9,688)	(12,583)	(16,943)
% Revenues	*1.1%*	*1.2%*	*1.1%*	*1.1%*	*1.1%*	*1.1%*	*1.1%*	*1.1%*	*1.1%*	*1.1%*	*1.1%*	*1.1%*
General and Admin	(6,113)	(6,508)	(8,259)	(8,647)	(8,426)	(9,347)	(10,622)	(11,642)	(23,181)	(29,526)	(40,037)	(56,989)
% Revenues	*3.5%*	*3.4%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.5%*	*3.6%*	*3.5%*	*3.5%*	*3.7%*
Operating Income	**17,532**	**21,095**	**29,569**	**34,016**	**36,216**	**43,718**	**52,962**	**62,719**	**50,756**	**102,211**	**195,615**	**333,891**
Operating Margin	10.1%	11.0%	12.5%	13.8%	15.0%	16.4%	17.5%	18.9%	7.9%	12.1%	17.1%	21.7%
Total Non-operating Income	**668**	**4,566**	**(1,872)**	**(1,871)**	**(1,870)**	**(1,871)**	**(1,871)**	**(1,870)**	**545**	**1,492**	**(7,481)**	**(7,482)**
Profit Before Taxes	**18,200**	**25,661**	**27,697**	**32,144**	**34,347**	**41,847**	**51,091**	**60,849**	**51,301**	**103,703**	**188,134**	**326,409**
Percent of Revenues	*10.5%*	*13.4%*	*11.7%*	*13.0%*	*14.3%*	*15.7%*	*16.8%*	*18.3%*	*7.9%*	*12.2%*	*16.4%*	*21.2%*
Taxes	(3,635)	(4,167)	(5,678)	(6,590)	(7,041)	(8,579)	(10,474)	(12,474)	(9,460)	(20,069)	(38,567)	(66,914)
Tax Rate	*20.0%*	*16.2%*	*20.5%*	*20.5%*	*20.5%*	*20.5%*	*20.5%*	*20.5%*	*18.4%*	*19.4%*	*20.5%*	*20.5%*
Net Income, Cont Ops	14,565	21,494	22,019	25,555	27,306	33,268	40,617	48,375	41,841	83,634	149,566	259,495
Minority Interest	(417)	(442)	(666)	(706)	(754)	(908)	(1,143)	(1,270)	(1,182)	(2,232)	(4,076)	(7,069)
Reported Income (TW GAAP)	**14,148**	**21,052**	**21,353**	**24,849**	**26,552**	**32,360**	**39,474**	**47,105**	**40,658**	**81,402**	**145,490**	**252,426**
Net margin	*8.1%*	*11.0%*	*9.0%*	*10.1%*	*11.0%*	*12.1%*	*13.0%*	*14.2%*	*6.3%*	*9.6%*	*12.7%*	*16.4%*
Y/Y %	*87.3%*	*179.9%*	*96.4%*	*68.9%*	*87.7%*	*53.7%*	*84.9%*	*89.6%*	*25.2%*	*100.2%*	*78.7%*	*73.5%*
EPS for Consensus (NT$)	**3.20**	**4.76**	**4.83**	**5.62**	**6.01**	**7.32**	**8.93**	**10.66**	**9.22**	**18.42**	**32.92**	**57.12**
Seq %	*-3.8%*	*48.8%*	*1.4%*	*16.4%*	*6.9%*	*21.9%*	*22.0%*	*19.3%*	*24.5%*	*99.8%*	*78.7%*	*73.5%*
Reported basic EPS (NT$)	**3.24**	**4.80**	**4.87**	**5.66**	**6.05**	**7.38**	**9.00**	**10.74**	**9.38**	**18.57**	**33.17**	**57.54**

Source: Company data, Morgan Stanley Research (e) estimates

Valuation methodology

We lift our price target from NT$628 to NT$858: This reflects our earnings estimate revisions for 2026-28. We continue to derive our price target using the base case value from a residual income model. We also raise our intermediate growth rate assumption from 9% to 10%, and terminal growth rate from 3% to 3.5% given the upcoming CPO opportunity, which should benefit the company's TAM. Our cost of equity is unchanged at 9.8% (beta of 1.3, risk premium of 6% and risk-free rate of 2%) and

Our bull case value rises from NT$700 to NT$1,000, while our bear case value increases from NT$380 to NT$500, implying 30x and 15x our 2027e EPS, respectively. We remain Overweight.

Exhibit 55: ASEH: Residual income model

	2026e	2027e	2028e	2029e	2030e	2031e	2032e	2033e	2034e	2035e	2036e	2037e
Total Equity	**430,375**	**527,024**	**692,156**	**819,884**	**960,384**	**1,114,935**	**1,284,941**	**1,471,947**	**1,677,654**	**1,903,931**	**2,152,837**	**2,426,633**
Net Profit	**81,402**	**145,490**	**252,426**	**277,669**	**305,436**	**335,980**	**369,578**	**406,535**	**447,189**	**491,908**	**541,098**	**595,208**
ROAE	**20.3%**	**30.4%**	**41.4%**	**36.7%**	**34.3%**	**32.4%**	**30.8%**	**29.5%**	**28.4%**	**27.5%**	**26.7%**	**26.0%**
Residual Income	39,038	88,627	166,588	186,382	200,982	216,841	234,133	253,035	273,731	296,420	321,314	348,644
Spread	**10.5%**	**20.6%**	**31.6%**	**26.9%**	**24.5%**	**22.6%**	**21.0%**	**19.7%**	**18.6%**	**17.7%**	**16.9%**	**16.2%**

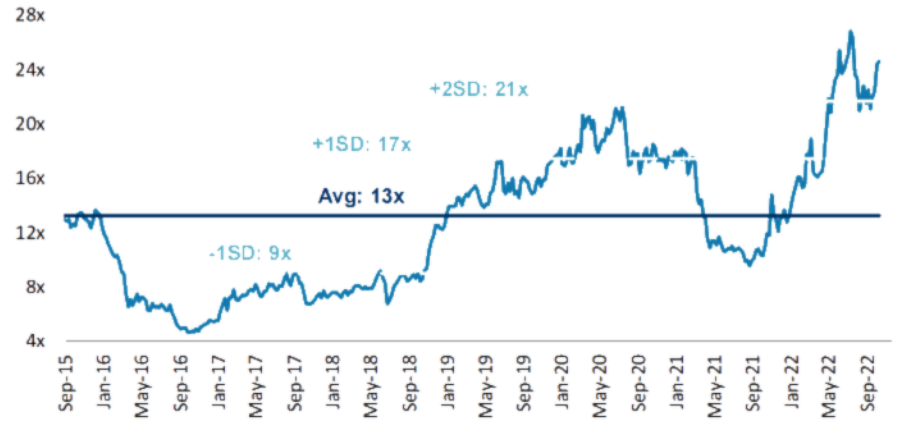
Ending Equity Capital	430,375
PV of Forecast Period	1,282,478
PV of Continuing Value	2,048,125
Equity Value	**3,760,978**
No. of Shares	4,383
Projected Price	**858**

Source: Company data, Morgan Stanley Research (e) estimates

Relative valuation

Over the past two months, ASE's share price has rallied (+45% vs. Taiex +25%) in response to investor expectations for its CPO testing and margin expansion. Despite this we remain OW, as the stock is still only trading at 21x our 2027e EPS, which we view as attractive for a company that has increasing pricing power, AI revenue, and margin growth. Our price target implies 26x our 2027e EPS, more than +2SD from its historical average of 13x since 2015.

Exhibit 56: ASEH: One-year forward P/E chart



Source: Company data, Morgan Stanley Research (e) estimates

Risk Reward – ASE Technology Holding Co. Ltd. (3711.TW)

We see further upside potential from AI/CPO; stay OW

PRICE TARGET NT$858.00

Base case, residual income model. Key assumptions: cost of equity of 9.8%, intermediate growth rate of 10%, terminal growth rate of 3.5%, and cash dividend payout ratio of 60%.

Consensus Price Target Distribution NT$545.00 NT$858.00 MS PT

Mean ◆ Morgan Stanley Estimates

RISK REWARD CHART



Key: Historical Stock Performance ● Current Stock Price ◆ Price Target

OVERWEIGHT THESIS

- Our checks show that ASE is receiving strong packaging overflow demand from TSMC, which could enjoy strong momentum in 2026 and after.
- We now think ASE's LEAP (leading-edge advanced packing) revenue is likely to reach US$8.5bn in 2027e.
- We also see strong revenue upside potential in CPO-related packaging and testing
- Our price target implies 26x our 2027e EPS, similar to +2SD from its historical average of 13x since 2015.
- However, we still view the P/E as attractive for a company that has increasing pricing power, AI revenue, and margin growth.

Consensus Rating Distribution

100% Overweight
0% Equal-weight
0% Underweight

MS Rating

Risk Reward Themes

Secular Growth: *Positive*
Technology Diffusion: *Positive*

BULL CASE NT$1,000.00

30x 2027e EPS

Strong semi growth; competition becomes rational thanks to merger; upside for SiP penetration rate with mainstream products: Competition becomes rational with sustained gross margin. Stronger price bargaining power and technology advancement thanks to smooth consolidation between ASE and SPIL. SiP shipments accelerate among mmWave AiP, camera modules, acoustic modules, 3D sensing, and wearables. ASEH develops comprehensive advanced packaging technology with high traction among customers.

BASE CASE NT$858.00

26x 2027e EPS

Strong cycle with AI/advanced packaging as the driving force: Demand for wire-bonding and flip-chip from consumer tech demand is recovering while most of the capacity in Taiwan is full. The advanced packaging business should be the major source of margin accretion in future. Pricing for ATM businesses is likely to rise 5-20% in 2026e. CoWoS outsourcing from TSMC may aid its top line and margin profile as well as the CPO opportunity in 2027/2028.

BEAR CASE NT$500.00

15x 2027e EPS

Semis enter down-cycle, with less back-end outsourcing and big customers searching for more cost-effective alternatives: The macro situation weakens, impairing semi demand. The need for second sources causes big customers to shift back-end orders away from ASE, along with pricing erosion given competition. SiP adoption remains limited outside of wearables. Gross margins keep deteriorating given competition from Chinese peers.

Risk Reward – ASE Technology Holding Co. Ltd. (3711.TW)

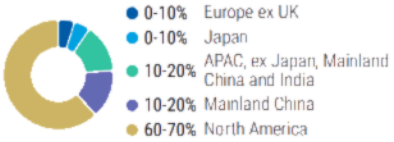
KEY EARNINGS INPUTS

Drivers	Dec 2025	Dec 2026e	Dec 2027e	Dec 2028e
Revenue from IC packaging Segment (NT$, mn)	311,799	434,737	644,087	955,264
Revenue from Testing Segment (NT$, mn)	71,899	99,741	145,396	215,145
Revenue from Direct Material Segment (NT$, mn)	5,192	8,245	9,987	11,949
Revenue from SiP (NT$, mn)	104,159	117,322	129,328	142,061

INVESTMENT DRIVERS

- Global semi growth
- New applications for SiP
- Synergies from merger with SPIL

GLOBAL REVENUE EXPOSURE



here

MS ALPHA MODELS

3/5 MOST — 3 Month Horizon

RISKS TO PT/RATING

RISKS TO UPSIDE

- Stronger-than-expected global economic and semiconductor growth
- Margin expansion through merger consolidation
- New wearables project wins with higher margins

RISKS TO DOWNSIDE

- Slower-than-expected global economic and semiconductor growth
- Further margin erosion amid price competition
- Lack of new features in wearables, causing consumers to lose interest

OWNERSHIP POSITIONING

Inst. Owners, % Active 69.3%

MS ESTIMATES VS. CONSENSUS

FY Dec 2026e

Sales / Revenue (NT$, mn)	813,000	847,748	866,810
EBITDA (NT$, mn)	149,593	190,688	193,404
Net income (NT$, mn)	76,000	81,402	88,403
EPS (NT$)	16.97	18.42	20.36

◆ Mean ◆ Morgan Stanley Estimates

ASEH: Financial summary

Income Statements

NT$mn (Years End Dec)	2025	2026e	2027e	2028e
Net sales	645,388	847,748	1,143,902	1,540,230
COGS	(531,195)	(665,976)	(852,053)	(1,086,353)
Depreciation Expense	(60,438)	(81,473)	(124,478)	(161,592)
Variable Cost	(470,757)	(584,502)	(727,575)	(924,760)
Gross profit	114,193	181,772	291,850	453,877
Operating expenses	(63,437)	(79,561)	(96,235)	(119,986)
Operating income	**50,756**	**102,211**	**195,615**	**333,891**
Non-operating income	545	1,492	(7,481)	(7,482)
Pre-tax income	51,301	103,703	188,134	326,409
Income tax	(10,643)	(22,301)	(42,643)	(73,982)
Reported net income	**40,658**	**81,402**	**145,490**	**252,426**
Adj.wtd.avg.shrs(m)	4,411	4,419	4,419	4,419
Basic EPS (NT$)	**9.38**	**18.57**	**33.17**	**57.54**
EPS for Consensus (NT$)	**9.22**	**18.42**	**32.92**	**57.12**

Balance Sheets

NT$mn (Years End Dec)	2025	2026e	2027e	2028e
Cash	92,469	36,203	13,954	110,956
Mkt Securities	7,754	7,754	7,754	7,754
AR/NR	125,042	119,231	156,616	211,328
Inventory	76,951	71,886	90,126	115,308
Other	11,579	11,579	11,579	11,579
Current Assets	313,795	246,653	280,029	456,924
Long-term investments	60,306	63,332	63,332	63,332
Fixed assets	421,115	658,155	850,674	975,736
Other assets	94,118	94,118	94,118	94,118
Total Assets	**889,333**	**1,062,257**	**1,288,152**	**1,590,109**
S/T borrowings	31,825	31,825	31,825	31,825
AP/NP	88,754	104,671	133,917	170,741
Other ST liabilities	121,549	121,549	121,549	121,549
LT debt	214,081	314,081	414,081	514,081
Other LT liabilities	57,536	57,536	57,536	57,536
Total Liabilities	**515,966**	**631,883**	**761,128**	**897,953**
Common stocks	44,361	44,361	44,361	44,361
Preferred stocks	0	0	0	0
Capital Researve	156,457	156,457	156,457	156,457
Retained earning	174,508	231,515	328,164	493,297
Minority Equity	0	0	0	0
Others	(1,959)	(1,959)	(1,959)	(1,959)
Total Equity	**373,368**	**430,375**	**527,024**	**692,156**
Total Liab. & Shrhldr's Equity	**889,333**	**1,062,257**	**1,288,152**	**1,590,109**

e = Morgan Stanley Research Estimates

Source: Morgan Stanley Research, company data

Cash Flow Statements

NT$mn (Years End Dec)	2025	2026e	2027e	2028e
Cashflow from Operations	**142,249**	**193,646**	**253,735**	**384,120**
Net profits	40,658	81,402	145,490	252,426
Depreciation	63,607	88,477	134,624	174,763
Working Capital Change	37,973	26,793	(26,379)	(43,069)
Other adjustments	11	(3,026)	0	0
Cashflow from Investing	**(165,644)**	**(325,517)**	**(327,142)**	**(299,825)**
Capex	(162,149)	(325,517)	(327,142)	(299,825)
Change of LT Investment	0	0	0	0
Change of ST Investment	(446)	0	0	0
Other adjustments	(3,049)	0	0	0
Cashflow from financing	**45,269**	**75,605**	**51,159**	**12,706**
Increase in L/T debt	81,307	0	0	0
Increase in S/T debt	(3,641)	0	0	0
Cash Dividend Paid	(23,034)	(24,395)	(48,841)	(87,294)
Dir& Emp Bonus Paid	0	0	0	0
Other adjustments	(9,363)	100,000	100,000	100,000
Exchange rate adjustment	(5,898)	0	0	0
Net change in cash	**15,976**	**-56,266**	**-22,248**	**97,001**

Financial Ratios

	2025	2026e	2027e	2028e
Growth(%)				
Turnover	8.4	31.4	34.9	34.6
Operating profits	29.6	101.4	91.4	70.7
Pretax profits	23.1	102.1	81.4	73.5
Net profits	25.2	100.2	78.7	73.5
EPS	24.5	99.8	78.7	73.5
Margins (%)				
Gross Margin	17.7	21.4	25.5	29.5
Operating Margin	7.9	12.1	17.1	21.7
EBITA Margin	17.2	21.7	28.0	32.2
Pretax Margin	7.9	12.2	16.4	21.2
Net Profit	6.3	9.6	12.7	16.4
Return (%)				
ROAE	11.3	20.3	30.4	41.4
ROAA	5.0	8.3	12.4	17.5
Gearing (%)				
Net Debt/Equity	(16.2)	(1.0)	3.4	(11.4)
Liabilities/Equity	138.2	146.8	144.4	129.7
Ratios (X)				
Current ratio	1.3	1.0	1.0	1.4
Quick ratio	0.9	0.6	0.6	1.0
Others				
AR/NR Turnover (days)	65	67	67	67
Inventory Turnover (days)	41	41	41	41
AP Turnover (days)	54	57	57	57
Cash Conversion (days)	52	51	51	51

KYEC: Estimate Revisions and Quarterly Financials

We nudge our 2026 and 2028 EPS s up 1% and 2%; 2027e is virtually unchanged: 2028 revenue and earnings assumptions reflects the start of new US capacity contribution.

Exhibit 57: KYEC: Earnings estimate revisions

(NT$ mn)	New 2026e	Old 2026e	Diff.%	New 2027e	Old 2027e	Diff.%	New 2028e	Old 2028e	Diff.%
Net sales	47,683	47,683	0%	67,303	67,303	0%	89,529	87,546	2%
Gross profit	19,106	19,106	0%	27,817	27,817	0%	38,172	37,330	2%
Operating profit	13,675	13,675	0%	21,516	21,559	0%	29,858	29,260	2%
Pretax income	14,020	14,044	0%	21,677	21,769	0%	29,975	29,488	2%
Net income	11,369	11,388	0%	17,559	17,634	0%	24,281	23,886	2%
Reported EPS	**9.06**	**8.95**	**1%**	**13.66**	**13.69**	**0%**	**18.89**	**18.55**	**2%**
Margins									
Gross margin	40.1%	40.1%		41.3%	41.3%		42.6%	42.6%	
Opex ratio	11.4%	11.4%		9.4%	9.3%		9.3%	9.2%	
Operating margin	28.7%	28.7%		32.0%	32.0%		33.4%	33.4%	
Pretax margin	29.4%	29.5%		32.2%	32.3%		33.5%	33.7%	
Net margin	23.8%	23.9%		26.1%	26.2%		27.1%	27.3%	

Source: Morgan Stanley Research estimates

Exhibit 58: KYEC: Quarterly financials

(NT$ mn)	1Q26	2Q26e	3Q26e	4Q26e	1Q27e	2Q27e	3Q27e	4Q27e	2025	2026e	2027e	2028e
Total Revenues	**10,192**	**11,142**	**12,079**	**14,271**	**15,076**	**16,117**	**17,493**	**18,617**	**34,934**	**47,683**	**67,303**	**89,529**
Q/Q %	*2.3%*	*9.3%*	*8.4%*	*18.2%*	*5.6%*	*6.9%*	*8.5%*	*6.4%*				
Y/Y %	*39.3%*	*33.2%*	*30.0%*	*43.2%*	*47.9%*	*44.7%*	*44.8%*	*30.5%*	*30.1%*	*36.5%*	*41.1%*	*33.0%*
Cost of Sales	(6,141)	(6,741)	(7,483)	(8,212)	(8,954)	(9,476)	(10,165)	(10,890)	(22,411)	(28,578)	(39,485)	(51,357)
Percent of Revenues	*60.3%*	*60.5%*	*62.0%*	*57.5%*	*59.4%*	*58.8%*	*58.1%*	*58.5%*	*64.2%*	*59.9%*	*58.7%*	*57.4%*
Gross Profit before dep and amort	6,472	7,077	7,581	9,884	9,107	9,626	10,313	17,998	19,390	31,014	47,044	59,330
Percent of Revenues	*63.5%*	*63.5%*	*62.8%*	*69.3%*	*60.4%*	*59.7%*	*59.0%*	*96.7%*	*55.5%*	*65.0%*	*69.9%*	*66.3%*
Gross Profit	**4,051**	**4,400**	**4,596**	**6,060**	**6,122**	**6,640**	**7,327**	**7,728**	**12,522**	**19,106**	**27,817**	**38,172**
Gross Margin	39.7%	39.5%	38.0%	42.5%	40.6%	41.2%	41.9%	41.5%	35.8%	40.1%	41.3%	42.6%
Incremental Margins												
Total Opex	(1,279)	(1,572)	(1,092)	(1,488)	(1,458)	(1,552)	(1,615)	(1,677)	(3,520)	(5,430)	(6,301)	(8,314)
Percent of Revenues	*12.5%*	*14.1%*	*9.0%*	*10.4%*	*9.7%*	*9.6%*	*9.2%*	*9.0%*	*10.1%*	*11.4%*	*9.4%*	*9.3%*
R&D	(307)	(315)	(278)	(288)	(357)	(375)	(338)	(318)	(930)	(1,188)	(1,388)	(1,778)
Percent of Revenues	*3.0%*	*2.8%*	*2.3%*	*2.0%*	*2.4%*	*2.3%*	*1.9%*	*1.7%*	*2.7%*	*2.5%*	*2.1%*	*2.0%*
Sales and Marketing	(98)	(104)	(157)	(200)	(196)	(210)	(227)	(242)	(464)	(559)	(875)	(1,164)
Percent of Revenues	*1.0%*	*0.9%*	*1.3%*	*1.4%*	*1.3%*	*1.3%*	*1.3%*	*1.3%*	*1.3%*	*1.2%*	*1.3%*	*1.3%*
General and Admin	(873)	(1,154)	(657)	(1,000)	(905)	(967)	(1,050)	(1,117)	(2,126)	(3,684)	(4,038)	(5,372)
Percent of Revenues	*8.6%*	*10.4%*	*5.4%*	*7.0%*	*6.0%*	*6.0%*	*6.0%*	*6.0%*	*6.1%*	*7.7%*	*6.0%*	*6.0%*
Operating Income	**2,772**	**2,828**	**3,504**	**4,572**	**4,664**	**5,089**	**5,713**	**6,051**	**9,003**	**13,675**	**21,516**	**29,858**
Operating margin	*27.2%*	*25.4%*	*29.0%*	*32.0%*	*30.9%*	*31.6%*	*32.7%*	*32.5%*	*25.8%*	*28.7%*	*32.0%*	*33.4%*
Total Non-operating Income	36	248	26	35	41	45	37	37	1,626	345	161	117
Profit Before Taxes	2,808	3,076	3,530	4,607	4,706	5,133	5,749	6,088	10,629	14,020	21,677	29,975
Percent of Revenues	*27.6%*	*27.6%*	*29.2%*	*32.3%*	*31.2%*	*31.9%*	*32.9%*	*32.7%*	*30.4%*	*29.4%*	*32.2%*	*33.5%*
Taxes	(522)	(584)	(670)	(875)	(894)	(975)	(1,092)	(1,156)	(2,624)	(2,651)	(4,118)	(5,694)
Tax Rate	*18.6%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*19.0%*	*24.7%*	*18.9%*	*19.0%*	*19.0%*
Net Income. Cont Ops	2,287	2,492	2,859	3,732	3,812	4,158	4,657	4,932	8,005	11,369	17,559	24,281
Reported Income (TW GAAP)	**2,287**	**2,492**	**2,859**	**3,732**	**3,812**	**4,158**	**4,657**	**4,932**	**11,016**	**11,369**	**17,559**	**24,281**
Percent of Revenues	*22.4%*	*22.4%*	*23.7%*	*26.1%*	*25.3%*	*25.8%*	*26.6%*	*26.5%*	*31.5%*	*23.8%*	*26.1%*	*27.1%*
Change vs Year Ago	*-46.7%*	*14.5%*	*24.2%*	*66.0%*	*66.7%*	*66.9%*	*62.9%*	*32.2%*	*41.6%*	*3.2%*	*54.5%*	*38.3%*
ModelWare EPS (NT$)	**1.86**	**2.04**	**2.22**	**2.90**	**2.97**	**3.23**	**3.62**	**3.84**	**8.96**	**9.06**	**13.66**	**18.89**
Basic shares (mn units)	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223
Diluted	1,227	1,224	1,285	1,285	1,285	1,285	1,285	1,285	1,230	1,255	1,285	1,285
Basic period End share	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223	1,223

Source: Company data, Morgan Stanley Research (e) estimates.

Valuation methodology

We raise our price target from NT$338 to NT$348: The price target change comes mostly from our 2028e earnings change – we expect its new US capacity start to contribute in 2H28. We continue to derive our price target (our base case scenario value) from a residual income model. All of our key valuation assumptions are the same: a cost of equity of 9.8% (risk premium of 6%, risk-free rate of 2%, and beta of 1.3), intermediate growth rate of 10.5%, and terminal growth rate of 3.0%.

Our bull case value rises from NT$415 to NT$428 and our bear case increases from NT $215 to NT$220, implying 31x and 16x our 2027e EPS, respectively.

Exhibit 59: KYEC: Residual income model

(NT$ mn)	2026e	2027e	2028e	2029e	2030e	2031e	2032e	2033e	2034e	2035e	2036e	2037e
Total Equity	**56,299**	**68,173**	**83,675**	**90,971**	**99,032**	**107,940**	**117,783**	**128,659**	**140,678**	**153,959**	**168,634**	**184,850**
Net Profit	**11,369**	**17,559**	**24,281**	**26,831**	**29,648**	**32,761**	**36,201**	**40,002**	**44,203**	**48,844**	**53,972**	**59,640**
ROAE	**21.3%**	**28.2%**	**32.0%**	**30.7%**	**31.2%**	**31.7%**	**32.1%**	**32.5%**	**32.8%**	**33.2%**	**33.5%**	**33.7%**
Residual Income	5,801	10,367	15,122	17,510	21,201	23,593	26,237	29,159	32,389	35,958	39,902	44,260
Spread	**11.5%**	**18.4%**	**22.2%**	**20.9%**	**21.4%**	**21.9%**	**22.3%**	**22.7%**	**23.0%**	**23.4%**	**23.7%**	**23.9%**

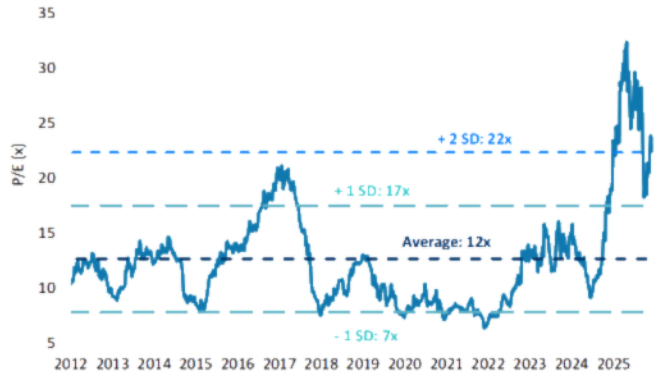
Ending Equity Capital	56,299
PV of Forecast Period	141,208
PV of Continuing Value	239,727
Equity Value	**437,233**
No. of Shares	1,255
Projected Price (NT$)	**348**

Source: Company data, Morgan Stanley Research (e) est mates

Relative valuation

Our price target implies a target multiple of 25x based on our 2027 EPS estimate, which we consider to be justified by the revenue CAGR of >30% that we project over 2025-28, with significantly higher AI earnings exposure in 2026 and beyond. We expect KYEC's gross margin profile to expand with increasing AI testing revenue exposure.

Exhibit 60: KYEC: One-year forward P/E chart



Source: Company data, TEJ, Morgan Stanley Research estimates

Exhibit 61: KYEC: One-year forward P/B vs. ROAE chart



Source: Company data, TEJ, Morgan Stanley Research estimates

Risk Reward – King Yuan Electronics Co Ltd (2449.TW)

AI revenue pushed out to 4Q26/2027

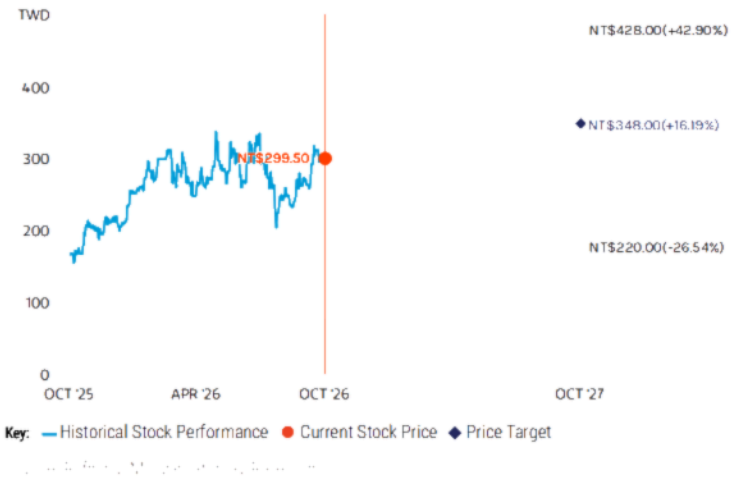
PRICE TARGET NT$348.00

Base case, residual income model. Key assumptions: cost of equity of 9.8%, intermediate-term growth rate of 10.5%, terminal growth rate of 3.0%, and cash dividend payout ratio of 65%.

Consensus Price Target Distribution NT$300.00 NT$342.65 MS PT NT$423.00

Mean ◆ Morgan Stanley Estimates

RISK REWARD CHART

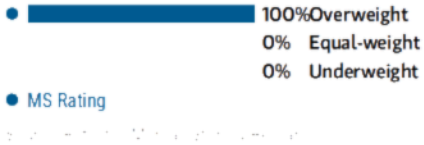


Key: Historical Stock Performance ● Current Stock Price ◆ Price Target

OVERWEIGHT THESIS

- 3Q26/2026 revenue guidance has been cut from slower R-series XPU ramp and lower test time.
- But, despite the short-term headwind, management reiterated that AI demand in 2027 remains robust, including some shipments being pushed out from 2H26 to 2027.
- Our AI demand breakdown suggests strong growth in TPU and CPU demand in 2027, each accounting for 10-15% of total revenue.
- We expect 2027 margin to be sustained >40% given rising utilization and cost pass-through to customers.
- Our price target implies 25x 2027e EPS, justified by our 2025-28e revenue CAGR of >35%. We see re-rating potential given structural GM improvement and continued pickup in AI revenue and earnings growth.

Consensus Rating Distribution



Risk Reward Themes

Pricing Power:	*Positive*
Secular Growth:	*Positive*

BULL CASE NT$428.00

31x 2027e EPS

Strong semiconductor cycle after macro uncertainties have eased: 1) AI testing demand continues to surprise to the upside, with AI GPU testing market share remaining stable before 2027. 2) 5G progress is faster than in our base case, leading to higher mmWave testing demand. 3) IDM outsourcing to OSAT is faster than expected, notably in 5G and AI-related testing demand. 4) US/China tensions ease. 5) Consumer/smartphone testing demand is stronger than expected.

BASE CASE NT$348.00

25x 2027e EPS

Strong HPC and auto demand offset by weak consumer semi testing demand: 1) AI GPU testing market share remains stable. 2) Longer testing time of 5G SoC and higer penetration of 5G smartphone help KYEC's SoC testing business to offset some unit decline in 2026. 3) HPC and automotive customers testing demand stays healthy in 2026, due to longer testing times for GPUs and FPGAs. 4) More normalized non-AI testing demand in 2026.

BEAR CASE NT$220.00

16x 2027e EPS

US-China trade tensions linger, coupled with inventory correction: 1) A sluggish 5G smartphone penetration rate hampers 5G smartphone demand. 2) Logic semi inventory correction persists longer than expected. 3) Testers are severely underutilized, leading to significant margin contraction. 4) Meaningful AI GPU testing market share loss.

Risk Reward – King Yuan Electronics Co Ltd (2449.TW)

KEY EARNINGS INPUTS

Drivers	Dec 2025	Dec 2026e	Dec 2027e	Dec 2028e
Wafer Sort revenue (NT$, mn)	2,624	2,793	2,393	3,010
Final Test revenue (NT$, mn)	3,781	3,757	3,294	5,989
Burn-In revenue (NT$, mn)	171	180	479	767

INVESTMENT DRIVERS

- 5G smartphone shipment/penetration rate
- Gross margin improvement/erosion
- China's semiconductor localization demand

GLOBAL REVENUE EXPOSURE



here

MS ALPHA MODELS

4/5 MOST — 3 Month Horizon

RISKS TO PT/RATING

RISKS TO UPSIDE

- Rise in shipments for core customers such as MediaTek
- Strong AI demand from both GPU and ASIC
- Penetration of wafer sorting business
- Rise in IDM outsourcing to OSAT

RISKS TO DOWNSIDE

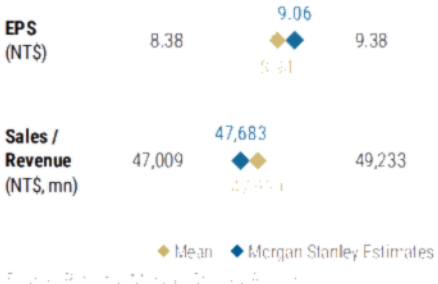
- Overall non-AI demand remaining weak
- Significant testing market share loss
- Drop in shipments for core customers such as MediaTek

OWNERSHIP POSITIONING

Inst. Owners, % Active 52.9%

MS ESTIMATES VS. CONSENSUS

FY Dec 2026e



Financial summary

Exhibit 62: Financial Summary

Income Statement

NT$mn (Years End Dec)	2025	2026e	2027e	2028e
Net sales	34,934	47,683	67,303	89,529
COGS	(22,411)	(28,578)	(39,485)	(51,357)
Depreciation Expense	(6,865)	(10,763)	(18,048)	(19,980)
Variable Cost	(15,547)	(17,814)	(21,437)	(31,377)
Gross profit	12,522	19,106	27,817	38,172
Operating expenses	(3,520)	(5,430)	(6,301)	(8,314)
Operating income	**9,003**	**13,675**	**21,516**	**29,858**
Non-operating income	1,626	345	161	117
Pre-tax income	10,629	14,020	21,677	29,975
Income tax	387	(2,652)	(4,118)	(5,694)
Reported net Income	**11,016**	**11,369**	**17,559**	**24,281**
Adj.wtd.avg.shrs(m)	1,230	1,255	1,285	1,285
Basic EPS (NT$)	**9.01**	**9.30**	**14.36**	**19.86**
EPS for consensus (NT$)	**8.96**	**9.06**	**13.66**	**18.89**

Balance Sheet

NT$mn (Years End Dec)	2025	2026e	2027e	2028e
Cash	17,964	4,276	2,970	11,814
Mkt Securities	0	0	0	0
AR/NR	7,203	9,669	13,647	18,154
Inventory	1,332	3,279	4,629	6,157
Other	2,420	1,560	1,858	2,196
Current Assets	28,919	18,785	23,104	38,322
Long-term investments	8,416	8,464	8,515	8,566
Fixed assets	60,554	98,166	112,394	114,399
Other assets	3,289	2,144	966	(213)
Total Assets	101,178	127,558	144,979	161,074
S/T borrowings	0	20,000	25,000	25,000
AP/NP	909	1,429	1,974	2,568
Other ST liabilities	15,010	15,010	15,010	15,010
LT debt	30,275	30,275	30,275	30,275
Other LT liabilities	4,546	4,546	4,546	4,546
Total Liabilities	**50,740**	**71,260**	**76,805**	**77,399**
Common stocks	12,227	12,227	12,227	12,227
Preferred stocks	0	0	0	0
Capital Researve	5,081	5,081	5,081	5,081
Retained earning	33,121	38,982	50,857	66,358
Other shareholders' equity	0	0	0	0
Total Equity	50,438	56,299	68,173	83,675
Total Liab. & Shrhldr's Equity	**101,178**	**127,558**	**144,979**	**161,074**

e = Morgan Stanley Research Estimates

Source: Morgan Stanley Research, Company Data

Cash Flow Statement

NT$mn (Years End Dec)	2025	2026e	2027e	2028e
Cashflow from Operations	**13,152**	**21,820**	**34,378**	**42,624**
Net profits	11,016	11,369	17,559	24,281
Depreciation	7,508	12,388	20,772	22,995
Working Capital Change	(2,028)	(3,894)	(4,782)	(5,442)
Other adjustments	(3,344)	1,958	829	789
Cashflow from Investing	**(13,078)**	**(50,000)**	**(35,000)**	**(25,000)**
Capex	(31,732)	(50,000)	(35,000)	(25,000)
Change of LT Investment	18,652	0	0	0
Change of ST Investment	52	0	0	0
Other adjustments	(50)	0	0	0
Cashflow from financing	**4,613**	**14,492**	**(684)**	**(8,780)**
Increase in L/T debt	9,918	0	0	0
Increase in S/T debt	0	20,000	5,000	0
Cash Dividend Paid	(4,891)	(5,508)	(5,684)	(8,780)
Dir& Emp Bonus Paid	0	0	0	0
Other adjustments	(414)	0	0	0
Exchange rate adjustment	(326)	0	(0)	0
Net change in cash	**4,361**	**-13,687**	**-1,307**	**8,844**

Financial Ratios

	2025	2026e	2027e	2028e
Growth(%)				
Turnover	30.1	36.5	41.1	33.0
Operating profits	45.9	51.9	57.3	38.8
Pretax profits	78.0	31.9	54.6	38.3
Net profits	41.6	3.2	54.5	38.3
EPS	41.5	1.1	50.8	38.3
Margins (%)				
Gross Margin	35.8	40.1	41.3	42.6
Operating Margin	25.8	28.7	32.0	33.4
EBITA Margin	45.4	51.3	58.8	55.7
Pretax Margin	30.4	29.4	32.2	33.5
Net Profit	31.5	23.8	26.1	27.1
Return (%)				
ROAE	23.2	21.3	28.2	32.0
ROAA	11.7	9.9	12.9	15.9
Gearing (%)				
Net Debt/Equity	(35.6)	27.9	32.3	15.8
Liabilities/Equity	100.6	126.6	112.7	92.5
Ratios (X)				
Current ratio	1.8	0.5	0.6	0.9
Quick ratio	1.6	0.4	0.4	0.7
Others				
AR/NR Turnover (days)	74	74	74	74
Inventory Turnover (days)	16	12	18	21
AP Turnover (days)	18	18	18	18
Cash Conversion (days)	72	68	73	77

WIN Semi: Estimate Revisions and Quarterly Financials

We raise our 2026, 2027, and 2028 EPS estimates 19%, 20%, and 58%, respectively: We increase our revenue forecasts for 2027-28 due to stronger aerospace business contribution as well as PD (photo diodes), mostly from SpaceX and Broadcom. Our margin assumptions rise slightly owing to ramping optical business and infrastructure. 2026 EPS change is mostly from higher-than-expected 2Q26 non-operating profit.

Exhibit 63: WIN Semi: Estimate revisions

(NT$ mn)	New 2026e	Old 2026e	Diff.%	New 2027e	Old 2027e	Diff.%	New 2028e	Old 2028e	Diff.%
Net sales	21,499	21,284	1%	28,255	25,521	11%	40,029	30,155	33%
Gross profit	6,040	6,145	-2%	9,359	8,441	11%	14,526	10,411	40%
Operating profit	2,862	2,957	-3%	5,427	4,590	18%	10,235	6,407	60%
Pretax income	4,045	3,321	22%	5,251	4,268	23%	10,059	6,085	65%
Net income	3,672	3,092	18.7%	4,801	4,015	20%	8,647	5,468	58%
EPS for consensus	**8.63**	**7.27**	**18.7%**	**11.29**	**9.44**	**20%**	**20.33**	**12.86**	**58%**
Margins									
Gross margin	28.1%	28.9%		33.1%	33.1%		36.3%	34.5%	
Operating margin	13.3%	13.9%		19.2%	18.0%		25.6%	21.2%	
Pretax margin	18.8%	15.6%		18.6%	16.7%		25.1%	20.2%	
Net margin	17.1%	14.5%		17.0%	15.7%		21.6%	18.1%	

Source: Morgan Stanley Research (e) estimates

Exhibit 64: WIN Semi: Quarterly financials

(NT$ mn)	1Q25	2Q25	3Q25	4Q25	1Q26	2Q26	3Q26e	4Q26e	2024	2025	2026e	2027e	2028e
Total Revenues	**3,576**	**3,780**	**4,488**	**4,794**	**4,590**	**5,257**	**5,882**	**5,770**	**17,458**	**16,639**	**21,499**	**28,255**	**40,029**
Sequential Change	*-3.5%*	*5.7%*	*18.7%*	*6.8%*	*-4.3%*	*14.5%*	*11.9%*	*-1.9%*					
Change vs Year Ago	*-19.5%*	*-23.8%*	*3.2%*	*29.4%*	*28.4%*	*39.1%*	*31.1%*	*20.4%*	*10.2%*	*-4.7%*	*29.2%*	*31.4%*	*41.7%*
Cost of Sales	**(2,977)**	**(3,083)**	**(3,283)**	**(3,270)**	**(3,381)**	**(3,773)**	**(4,175)**	**(4,131)**	**(13,416)**	**(12,612)**	**(15,460)**	**(18,895)**	**(25,503)**
Gross Profit	**598**	**698**	**1,205**	**1,525**	**1,209**	**1,485**	**1,707**	**1,639**	**4,042**	**4,026**	**6,040**	**9,359**	**14,526**
Gross Margin	16.7%	18.5%	26.9%	31.8%	26.3%	28.2%	29.0%	28.4%	23.2%	24.2%	28.1%	33.1%	36.3%
Total Opex	(815)	(817)	(820)	(858)	(780)	(743)	(816)	(839)	(3,280)	(3,309)	(3,177)	(3,933)	(4,291)
Percent of Revenues	*22.8%*	*21.6%*	*18.3%*	*17.9%*	*17.0%*	*14.1%*	*13.9%*	*14.5%*	*18.8%*	*19.9%*	*14.8%*	*13.9%*	*10.7%*
R&D	(428)	(392)	(377)	(404)	(357)	(265)	(275)	(280)	(1,691)	(1,600)	(1,176)	(1,575)	(1,740)
Percent of Revenues	*12.0%*	*10.4%*	*8.4%*	*8.4%*	*7.8%*	*5.0%*	*4.7%*	*4.8%*	*9.7%*	*9.6%*	*5.5%*	*5.6%*	*4.3%*
Sales and Marketing	(104)	(110)	(107)	(128)	(110)	(111)	(124)	(122)	(442)	(449)	(468)	(848)	(1,001)
Percent of Revenues	*2.9%*	*2.9%*	*2.4%*	*2.7%*	*2.4%*	*2.1%*	*2.1%*	*2.1%*	*2.5%*	*2.7%*	*2.2%*	*3.0%*	*2.5%*
General and Admin	(283)	(315)	(336)	(325)	(313)	(367)	(417)	(437)	(1,147)	(1,259)	(1,534)	(1,510)	(1,550)
Percent of Revenues	*7.9%*	*8.3%*	*7.5%*	*6.8%*	*6.8%*	*7.0%*	*7.1%*	*7.6%*	*6.6%*	*7.6%*	*7.1%*	*5.3%*	*3.9%*
Operating Income	**(217)**	**(119)**	**386**	**667**	**429**	**742**	**891**	**801**	**762**	**717**	**2,862**	**5,427**	**10,235**
Percent of Revenues	*-6.1%*	*-3.1%*	*8.6%*	*13.9%*	*9.3%*	*14.1%*	*15.1%*	*13.9%*	*4.4%*	*4.3%*	*13.3%*	*19.2%*	*25.6%*
Total Non-operating Income(Loss)	**156**	**(432)**	**511**	**437**	**101**	**447**	**314**	**321**	**(429)**	**672**	**1,182**	**(175)**	**(176)**
Profit Before Taxes	**(61)**	**(551)**	**897**	**1,104**	**530**	**1,188**	**1,205**	**1,122**	**333**	**1,389**	**4,045**	**5,251**	**10,059**
Percent of Revenues	*-1.7%*	*-14.6%*	*20.0%*	*23.0%*	*11.5%*	*22.6%*	*20.5%*	*19.4%*	*1.9%*	*8.4%*	*18.8%*	*18.6%*	*25.1%*
Change vs Year Ago	*-119.7%*	*-220.9%*	*263.9%*	*-262.9%*	*-970.3%*	*-315.7%*	*34.3%*	*1.6%*					
Taxes	(2)	61	(213)	(142)	(83)	(284)	(241)	(224)	7	(297)	(832)	(1,050)	(2,012)
Tax Rate	*-4.0%*	*11.0%*	*23.8%*	*12.9%*	*15.7%*	*23.9%*	*20.0%*	*20.0%*	*-2.1%*	*21.4%*	*20.6%*	*20.0%*	*20.0%*
Net Income, Cont Ops	(63)	(490)	684	962	446	905	964	897	340	1,092	3,212	4,201	8,047
Percent of Revenues	*-1.8%*	*-13.0%*	*15.2%*	*20.1%*	*9.7%*	*17.2%*	*16.4%*	*15.6%*	*1.9%*	*6.6%*	*14.9%*	*14.9%*	*20.1%*
Minority Interest	79	69	387	67	87	72	150	150	428	601	459	600	600
Reported Income (TW GAAP)	**16**	**(421)**	**1,070**	**1,029**	**533**	**977**	**1,114**	**1,047**	**768**	**1,694**	**3,672**	**4,801**	**8,647**
Percent of Revenues	*0.4%*	*-11.1%*	*23.8%*	*21.5%*	*11.6%*	*18.6%*	*18.9%*	*18.2%*	*4.4%*	*10.2%*	*17.1%*	*17.0%*	*21.6%*
Change vs Year Ago	*-96.2%*	*-186.7%*	*368.7%*	*-392.1%*	*3312.4%*	*-332.1%*	*4.1%*	*1.8%*	*-1064.3%*	*120.5%*	*116.8%*	*30.8%*	*80.1%*
Reported Diluted EPS (NT$, TW GAAP)	**0.04**	**(0.99)**	**2.52**	**2.42**	**1.25**	**2.30**	**2.62**	**2.46**	**1.81**	**3.98**	**8.63**	**11.29**	**20.33**
Reported Basic EPS (NT$, GAAP)	**0.04**	**(0.99)**	**2.52**	**2.43**	**1.26**	**2.30**	**2.63**	**2.47**	**1.81**	**4.00**	**8.66**	**11.32**	**20.40**

Source: Company data, Morgan Stanley Research (e) estimates

WIN Semi: Valuation Methodology

Our price target (base case value) increases from NT$300 to NT$600: This factors in our EPS forecast changes for 2026 to 2028, as well as increases in our valuation methodology assumptions.

We continue to derive our price target from a residual income model – we believe it best presents the value of the company. We raise our key valuation assumptions for growth because we believe the company is enjoying stronger revenue growth than in the past, when most of its revenue was coming only from smartphones. The changes include our intermediate growth rate assumption rising from 12% to 15% and terminal growth from 3% to 4%. Our cost of equity remains the same at 8% (beta of 1.0, equity risk premium of 6%, risk-free rate of 2%).

Our bull case value rises from NT$650 to NT$900 and our bear case value from NT$175 to NT$300, implying 80x and 26x our 2027 EPS estimates, respectively.

Exhibit 65: WIN Semi: Residual income model

(NT$ mn)	2026e	2027e	2028e	2029e	2030e	2031e	2032e	2033e	2034e	2035e	2036e	2037e
Total Equity	**45,092**	**46,413**	**49,272**	**52,503**	**56,220**	**60,494**	**65,409**	**70,521**	**75,838**	**81,367**	**87,117**	**93,097**
Net Profit	**3,672**	**4,801**	**8,647**	**9,944**	**11,436**	**13,151**	**15,124**	**15,729**	**16,358**	**17,012**	**17,693**	**18,401**
ROAE	**8.4%**	**10.5%**	**18.1%**	**19.5%**	**21.0%**	**22.5%**	**24.0%**	**23.1%**	**22.4%**	**21.6%**	**21.0%**	**20.4%**
Residual Income	182	1,124	4,676	5,687	6,845	8,172	9,694	9,905	10,122	13,380	13,834	14,305
Spread	**0.4%**	**2.5%**	**10.1%**	**11.5%**	**13.0%**	**14.5%**	**16.0%**	**15.1%**	**14.4%**	**13.6%**	**13.0%**	**12.4%**
Ending Equity Capital	45,092											
PV of Forecast Period	50,615											
PV of Continuing Value	159,517											
Equity Value	**255,225**											
No. of Shares	425											
Projected Price (NT$)	**600**											

Source: Morgan Stanley Research (e) estimates.

Exhibit 66: WIN Semi's one-year forward P/B band



Source: FactSet, Morgan Stanley Research estimates

Risk Reward – WIN Semiconductors Corp (3105.TWO)

More PD and Aerospace business; EW

PRICE TARGET NT$600.00

Base-case, residual income model. Key assumptions: cost of equity of 8.0% (beta of 1.0), intermediate growth rate of 15.0%, and terminal growth rate of 4.0%.

Consensus Price Target Distribution NT$142.00 ◆NT$600.00 MS PT

◆ Mean ◆ Morgan Stanley Estimates

RISK REWARD CHART

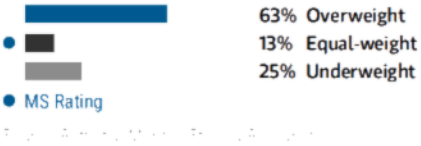


Key: —Historical Stock Performance ● Current Stock Price ◆ Price Target

EQUAL-WEIGHT THESIS

- Stronger iPhone demand appears likely in the near term, but smartphone growth is mature compared to AI demand.
- We expect to see more GaAs wafer consumption as we migrate to the WiFi 7 era, as WiFi 7 has three bands (2.4 GHz, 5 GHz and 6 GHz) vs. WiFi 6 at just two (2.4 GHz, 5 GHz).
- GaN penetration in satellite business could lift the wafer ASP.
- We think optical transceivers and robotics may become future drivers, as WIN Semi has the technology to enable products like EML, CW-DFB and DML..
- We are EW. The company is facing pricing competition from Chinese peers and AWSC. Valuation is also fair based on our new price target.

Consensus Rating Distribution



Risk Reward Themes

New Data Era:	*Positive*
Pricing Power:	*Positive*
Secular Growth:	*Positive*

BULL CASE NT$900.00

80x 2027e EPS

3D sensing, WiFi 7 and 5G take-off: AR adoption rate beats expectations in 2027 and beyond. Smartphone demand appears to be stronger than expected, while 5G and WiFi 7 implementation starts at a healthy speed. Power amplifier (PA) customers such as Murata and Broadcom continue to work with WIN Semi, while PA customer Qualcomm's RF demand beats expectations. Win Semi also achieves significant market share in optical transceiver and 3D sensing production.

BASE CASE NT$600.00

53x 2027e EPS

Orders from Chinese smartphone customers and iPhone start to pick up: WiFi 7 demand grows as forecast in 2026 and beyond. Key communications PA customers continue to work with WIN Semi, while Chinese smartphone demand starts to show recovery. AI related products such as optical transceivers and 3D sensing might also drive up its utilization rate. We expect UTR to remain at 60-80% in 2027.

BEAR CASE NT$300.00

26x 2027e EPS

3D sensing, 5G and WiFi 7 adoption freeze: 3D sensing adoption rate declines without killer applications in 2027. EM smartphone demand does not recover, while 5G and WiFi 7 commercialization is further delayed. Major communications PA customers find alternative partners with similar GaAs technologies, while PA customer Qualcomm's RF demand misses our base case expectations significantly.

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Risk Reward – WIN Semiconductors Corp (3105.TWO)

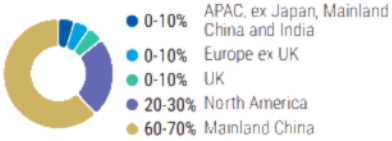
KEY EARNINGS INPUTS

Drivers	Dec 2025	Dec 2026e	Dec 2027e	Dec 2028e
Wafer shipments (6" equiv) (NT$, mn)	258	345	417	532
Blended wafer ASP (US$) (NT$, mn)	1,806	1,809	1,997	2,242
Utilization rate (%) (%)	50.0	66.3	68.8	78.1

INVESTMENT DRIVERS

- 3D sensing adoption in smartphones or faster deployment for 5G
- Share gains for key fabless customers at a more significant speed
- Chinese smartphone demand

GLOBAL REVENUE EXPOSURE



MS ALPHA MODELS

4/5 MOST

3 Month Horizon

RISKS TO PT/RATING

RISKS TO UPSIDE

- WIN Semi being able to raise utilization rate.
- Stronger-than-expected gross margin improvement
- More orders from Apple for the next-gen iPhone RF [update?]
- LD (laser diode) qualification

RISKS TO DOWNSIDE

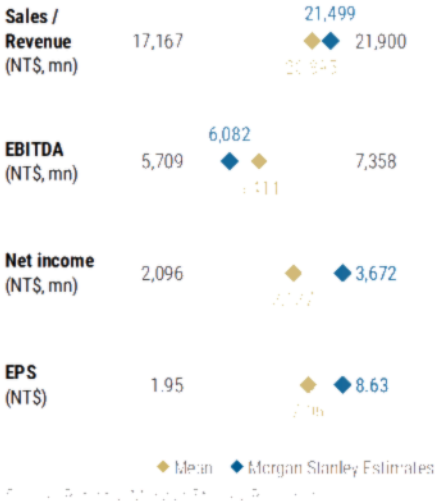
- No adoption of 3D sensing and AR applications without killer applications
- Slowdown in outsourcing trend among integrated device manufacturers
- Build-up of component inventories amid poor smartphone demand

OWNERSHIP POSITIONING

Inst. Owners, % Active 59.9%

MS ESTIMATES VS. CONSENSUS

FY Dec 2026e



WIN Semi: Financial Summary

Exhibit 67: WIN Semi: Financial summary

Income Statement, 2024-2028e, Year End Dec

(NT$ mn)	2024	2025	2026e	2027e	2028e
Turnover	**17,458**	**16,639**	**21,499**	**28,255**	**40,029**
YoY Growth	*10.2%*	*-4.7%*	*29.2%*	*31.4%*	*41.7%*
Less: COGS	**(13,416)**	**(12,612)**	**(15,460)**	**(18,895)**	**(25,395)**
Variable costs	(9,690)	(9,509)	(12,743)	(15,258)	(22,016)
Depreciation & amort	(3,725)	(3,103)	(2,717)	(3,638)	(3,379)
Gross profit	**4,042**	**4,026**	**6,040**	**9,359**	**14,634**
YoY Growth	*16.5%*	*-0.4%*	*50.0%*	*55.0%*	*56.4%*
% margin	*23.2%*	*24.2%*	*28.1%*	*33.1%*	*36.6%*
Operating Expenses:	**(3,280)**	**(3,309)**	**(3,177)**	**(3,933)**	**(4,251)**
R&D	(1,691)	(1,600)	(1,176)	(1,575)	(1,700)
Sales and Marketing	(442)	(449)	(468)	(848)	(1,001)
General and Admin	(1,147)	(1,259)	(1,534)	(1,510)	(1,550)
Operating Profit	**762**	**717**	**2,862**	**5,427**	**10,383**
YoY Growth	*-1465.3%*	*-5.9%*	*299.1%*	*89.6%*	*91.3%*
% margin	*4.4%*	*4.3%*	*13.3%*	*19.2%*	*25.9%*
Total Non-op	**(429)**	**672**	**1,182**	**(175)**	**(176)**
Pretax Profit	333	1,389	4,045	5,251	10,207
YoY Growth	*-149.0%*	*317.4%*	*191.1%*	*29.8%*	*94.4%*
% margin	*1.9%*	*8.4%*	*18.8%*	*18.6%*	*25.5%*
Tax	7	(297)	(832)	(1,050)	(2,041)
Reported Net Income	768	1,694	3,672	4,801	8,766
ModelWare EPS (NT$)	**1.81**	**3.98**	**8.63**	**11.29**	**20.61**

Key Ratios

	2024	2025	2026e	2027e	2028e
Return (%)					
ROAA	*1.2%*	*2.6%*	*5.6%*	*7.1%*	*12.8%*
ROAE	*2.1%*	*4.0%*	*8.0%*	*10.2%*	*18.3%*
OP. ATO	*30.3%*	*33.1%*	*40.0%*	*50.1%*	*65.4%*
Gearing (x)					
Net Debt/ Equity	0.3x	0.1x	0.0x	0.0x	0.0x
Current Ratio	1.6x	2.5x	1.6x	1.7x	1.9x
Quick Ratio	0.9x	1.5x	0.9x	0.9x	0.9x
Operating Cycle					
AR/NR Turnover (days)	46	53	46	40	32
Inventory Turnover (days)	183	204	179	164	136
AP Turnover (days)	59	68	63	58	48
Cash Conversion (days)	170	189	162	146	120

e = Morgan Stanley Research Estimates
Source: Company Data, Morgan Stanley Research

Balance sheet

(NT$ mn)	2024	2025	2026e	2027e	2028e
Assets					
Cash & Equivalent	5,419	7,067	7,015	6,773	6,602
MarketableSecurity	275	324	295	295	295
A/R & N/R	1,226	1,597	2,212	2,997	4,139
Inventories	4,992	4,979	6,611	8,286	10,926
Other Current Ass.	299	435	389	389	389
Total current assets	**12,455**	**14,557**	**16,828**	**19,046**	**22,657**
LT Investment	6,520	8,872	10,596	10,596	10,596
Total Fixed Assets	28,265	19,672	18,688	18,381	18,606
Total Other Assets	17,018	17,628	18,775	18,775	18,775
Total Assets	**64,259**	**60,729**	**64,888**	**66,799**	**70,635**
A/P & N/P	1,094	1,662	2,330	2,921	3,851
Accrued Expenses	0	0	0	0	0
Other Payable	2,199	3,135	3,692	3,692	3,692
Total Current Liab.	**7,603**	**5,865**	**10,302**	**10,893**	**11,823**
L-T Liabilities	16,532	12,328	8,973	8,973	8,973
Total Other L-T Liab	986	545	520	520	520
Total Liabilities	**25,121**	**18,738**	**19,795**	**20,386**	**21,316**
Common Stocks	4,239	4,239	4,239	4,239	4,239
Preferred Stocks					
Capital Reserve	9,970	9,977	10,059	10,059	10,059
Retained earnings	23,909	27,329	30,357	31,677	34,584
Treasury Stock	0	0	0	0	0
Total Equity	**39,138**	**41,991**	**45,092**	**46,413**	**49,319**

Cash Flow Statement

(NT$ mn)	2024	2025	2026e	2027e	2028e
Adj. Net Income	340	1,092	3,212	4,201	8,166
Depreciation	4,700	3,994	3,219	4,187	3,889
Net Investment Losses (Gains)	17	1,953	0	0	0
Others	(2,163)	(2,158)	(2,935)	(1,870)	(2,852)
Cash Flow-Operating	**4,900**	**4,953**	**3,497**	**6,518**	**9,202**
(Purchase) of FA	(1,222)	(1,691)	(2,471)	(3,880)	(4,114)
Sale of Fix Asset	1	6,235	0	0	0
(Purchase)L-T Inv.	0	0	0	0	0
Sale of L-T Inv.	0	0	25	0	0
Sale(Pur.)S-T Inv.	(77)	61	103	0	0
Cash Flow-Investing	**(1,055)**	**5,112**	**(2,177)**	**(3,880)**	**(4,114)**
Inc(Dec)-S-T Debt	(3,394)	(7,506)	(475)	0	0
Dividend Paid	0	(424)	(1,016)	(2,881)	(5,259)
Dir.&Emp.Bonus	0	0	0	0	0
Proceed from New Issue	0	0	0	0	0
Dec/Inc-TreasureSt	0	0	0	0	0
Others	(5,545)	(350)	145	0	0
Cash Flow-Financing	**(8,939)**	**(8,280)**	**(1,346)**	**(2,881)**	**(5,259)**
Change in Cash	**(4,906)**	**1,648**	**(52)**	**(242)**	**(171)**
Net cash/(debt), b/f	10,326	5,419	7,067	7,015	6,773
Net cash/(debt), c/f	**5,419**	**7,067**	**7,015**	**6,773**	**6,602**

Risk Reward Reference links

1. View explanation of Options Probabilities methodology - Options_Probabilities_Exhibit_Link.pdf

2. View descriptions of Risk Rewards Themes - RR_Themes_Exhibit_Link.pdf

3. View explanation of regional hierarchies - GEG_Exhibit_Link.pdf

4. View explanation of Theme/Exposure methodology - ESG_Sustainable_Solutions_External_Link.pdf

5. View explanation of HERS methodology - ESG_HERS_External_Link.pdf