



## TSMC (2330.TW/2330 TT)

### 2023 sales on track; 2024 recovery looks increasingly promising

FTSE4Good TIP Taiwan ESG Index stock

#### Outperform · Maintained

Price as of October 6 (NT\$)	532
12M target price (NT\$)	703
Previous target price (NT\$)	658
Revised up (%)	6.8
Upside (%)	32.1

#### Key message

Looking into 2024, we expect a strong recovery, driven by: (1) restocking demand; (2) end-demand recovery; (3) market share gains; and (4) continuing silicon content growth in HPC and 5G applications. We consider the recent share price correction as a great entry point.

#### Trading data

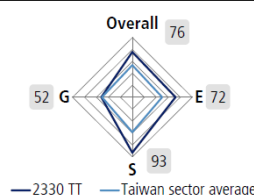
Mkt cap (NT\$/US\$m)	13,796/427,519
Outstanding shares (mn)	25,932
Foreign ownership (mn)	18,666
3M avg. daily trading (mn)	16.60
52-week trading range (NT\$)	371.0 -593

Performance	3M	6M	12M
Absolute (%)	-5.9	0.4	18
Relative (%)	-4.4	-4.1	-0.9

#### Quarterly EPS

NT\$	1Q	2Q	3Q	4Q
2022	7.82A	9.14A	10.83A	11.41A
2023	7.98A	7.01A	7.24F	7.76F
2024	7.12F	8.34F	10.57F	13.04F

#### ESG score card



Source: Refinitiv

#### Event

TSMC will host its 3Q23 earnings conference on October 19. We expect the company to maintain 2023 sales guidance of a 10% YoY decline. Looking into 2024, we expect a strong recovery, driven by: (1) restocking demand; (2) end-demand recovery; (3) market share gains; and (4) continuing silicon content growth in HPC and 5G applications.

#### Impact

**2023 sales in line with guidance.** We expect TSMC to maintain 2023 sales guidance of a 10% YoY decline, contrary to recent market concerns of another downward guidance revision. As such, we forecast 4Q23 sales will grow 10% QoQ or more to US\$18.9bn, with gross margin of 51-53%, versus consensus of 52%. We estimate 3Q23 EPS of NT\$7.24, up 3.2% QoQ, but down 33.2% YoY, with respective gross and operating margins of 53.2% and 40.1%, versus consensus of NT\$7.23, 52.7%, and 40.0%.

**2024 recovery looks increasingly promising.** We raise our 2024 sales and EPS estimates by a respective 6.9% and 6.8% to NT\$2,699.4bn, up 26.4% YoY (up 24% in US dollar terms), and NT\$39.06, up 30.2% YoY, versus consensus of NT\$2,565.3bn and NT\$36.71. After several quarters of inventory correction, we expect inventory to return to healthy levels exiting 2023, and restocking demand, coupled with end-demand recovery for PC and smartphones, could lead to meaningful cyclical recovery in 2024. Furthermore, growing adoption of AI for both PC and 5G smartphones, in addition to rising penetration of accelerated computing in data centers, will continue to drive silicon content growth across multiple applications, which will boost wafer revenue for TSMC. We forecast 2024 N3 wafer shipments will be 3-4x the 2023 total.

**Cloud AI to edge AI.** While current edge AI applications are limited, we believe the edge AI computing platform, which is being defined by Microsoft (US), Intel (US), AMD (US), and PC OEMs, could result in an upgrade cycle for PC, as well as continued silicon content growth, which would benefit TSMC. Both Intel and AMD have emphasized the integration of neural processing units (NPU) in their current and future CPUs, which are designed to run on-device AI workloads. With Windows 12 expected to launch in late 2024, we could see the more extensive release of AI computers in 2025 that would meet Microsoft's AI PC computing capability requirements and accelerate the development of on-device AI applications. Furthermore, we think the smartphone industry would follow suit as Qualcomm (US) and MediaTek (2454 TT, NT\$786, OP) have both highlighted the integration of more powerful AI engines in their upcoming SoCs to run on-device AI applications, in addition to their upcoming ARM-based computing solutions for Windows and Chromebook.

#### Valuation & Action

TSMC shares have underperformed the Taiex by 2% since August, and have fallen 10% from July's high. We believe earnings downward revisions have run their course, and expect upward earnings revisions in the coming months. We revise up 2024F sales and EPS to NT\$2,699.4bn (up 26.4% YoY) and NT\$39.06 (up 30.2% YoY), versus consensus of NT\$2,565.3bn and NT\$36.71. Shares are trading at respective 2023-24F PE of 18x and 14x, versus a five-year average of 16-17x. We maintain Outperform and revise up our target price from NT\$658 to NT\$703, based on 18x 2024F EPS. We consider the recent share price correction as a great entry point.

#### Risks

Global macro and geopolitical uncertainties; prolonged inventory correction.

#### Key financials and valuations

	Dec-20A	Dec-21A	Dec-22A	Dec-23F	Dec-24F
Revenue (NT\$m)	1,339,255	1,587,415	2,263,891	2,136,439	2,699,401
Gross profit (NT\$m)	711,130	819,537	1,348,355	1,149,610	1,481,651
Operating profit (NT\$m)	566,784	649,981	1,121,279	887,082	1,167,978
Net profit (NT\$m)	517,885	596,540	1,016,530	777,643	1,012,830
EPS (NT\$)	19.97	23.01	39.20	29.99	39.06
Cash DPS (NT\$)	10.00	11.00	11.00	12.00	13.00
EPS growth (%)	50.0	15.2	70.4	(23.5)	30.2
PE (x)	26.6	23.1	13.6	17.7	13.6
PB (x)	7.5	6.4	4.7	4.0	3.3
EV/EBITDA (x)	14.8	12.4	8.4	9.0	7.0
Net debt to equity (%)	Net cash	Net cash	Net cash	Net cash	Net cash
Dividend yield (%)	1.9	2.1	2.1	2.3	2.4
Return on average equity (%)	29.8	29.7	39.8	24.4	26.8

Source: Company data, KGI Research estimates

**Figure 1: TSMC's 2024F key growth drivers**

Client	Key growth drivers
Apple	<ul style="list-style-type: none"> <li>All new iPhone series will adopt 3nm in 2024F, driving significant silicon content growth</li> <li>New iPad and MacBook which are scheduled to launch in 2024F will adopt M3/M3 Pro/M3 Max chips (produced by 3nm)</li> </ul>
AMD	<ul style="list-style-type: none"> <li>M1300 will enter MP in 2024F</li> <li>Bergamo and Genoa will continue to ramp up in 2024F</li> <li>Zen 5C architecture will adopt 4nm and 3nm process, which could boost significant silicon content growth</li> <li>New NB APU strux point will be launched in 2H24F, and silicon content per chip is higher than previous generation given bigger die size</li> <li>PC/NB demand will recover in 2024F, driving desktop CPU/GPU and NB APU demand</li> <li>H100 will continue to ramp up in 2024F</li> </ul>
Nvidia	<ul style="list-style-type: none"> <li>GH200 will enter MP in 2024F</li> <li>B100 GPU will adopt chiplet architecture and N4 process, which will boost silicon content growth, and it's expected to ramp up in 4Q24F</li> <li>New flagship smartphone SoC (dimensity 9400?) will adopt 3nm process, which will enter MP in 2H24F</li> </ul>
MediaTek	<ul style="list-style-type: none"> <li>2024F MediaTek's smartphone SoC shipments will be dominated by second-generation 5G SoC (Dimensity 7200, 8000, 9000 and 9200)</li> <li>Silicon dollar content for MediaTek's second-generation 5G SoC is 2-3x higher than that of first-generation 5G SoC</li> <li>New flagship smartphone SoC (Snapdragon 8 Gen 3) will adopt 4nm process, and will enter MP in 4Q23F</li> </ul>
Qualcomm	<ul style="list-style-type: none"> <li>Snapdragon 8 Gen 3's silicon content per socket is 25% higher than 8 Gen 2</li> <li>iPhone's modem X75 will adopt TSMC's 4nm process in 2024F (X70 was source from Samsung's 4nm process)</li> </ul>
Intel	<ul style="list-style-type: none"> <li>Meteor Lake will enter MP in 2024F. We estimate Meteor Lake's silicon content per socket is around US\$35-40</li> <li>Arrow Lake will enter MP in end-2024F, and Graphic tile will adopt TSMC's 3nm process, SoC/I/O tile will adopt N6 process</li> </ul>
Broadcom	<ul style="list-style-type: none"> <li>Google TPU v5 will continue to ramp up in 2024F</li> </ul>
Others	<ul style="list-style-type: none"> <li>Process node migration from most HPC/ASIC clients, boosting silicon content growth</li> </ul>

Source: KGI Research estimates

### HPC silicon content analysis – Desktop & NB CPU

**Apple M CPU silicon content per socket averaged 20% from M2 to M3 series.** Apple (US), TSMC's top HPC client, will launch a new MacBook series, which will be upgraded from M2-series CPU to M3-series CPU. Furthermore, we expect Apple to also upgrade from M2-series CPU to M3-series CPU for its iPad-series products. Per our estimate, silicon content per socket will rise by 5-35% from the M2-series to M3-series, given higher transistor count and node migration from N5 to N3. More importantly, we note that iPhone 15/15 Plus have adopted A16 CPU produced via TSMC's N4 process, while iPhone 15 Pro/Pro Max have adopted A17 CPU, but we expect the next-generation iPhone series to all utilize TSMC's N3 process, which could further drive silicon content growth. As such, we expect migration from the M2-series to M3-series, as well as all next-generation iPhone models adopting the N3 process in 2024F, to be a significant sales driver for TSMC.

**Figure 2: Apple M CPU silicon dollar content growth per socket averaged 20% from M2-series to M3-series**

	M1	M2	M3	M1 Pro	M2 Pro	M3 Pro	M1 Max	M2 Max	M3 Max
Foundry	TSMC	TSMC	TSMC	TSMC	TSMC	TSMC	TSMC	TSMC	TSMC
Node	N5	N5+	N3	N5	N5+	N3	N5	N5+	N3
Silicon content per socket (US\$)	40-45	50-55	70-75	100-105	120-125	120-125	200-205	265-270	330-335
Incremental wafer revenue per socket (%)		20-25%	30-35%		15-20%	0-5%		30-35%	20-25%

Source: Company data, KGI Research estimates

**Silicon content per socket up more than 35% for AMD's NB APU.** AMD, TSMC's other top HPC client, will launch its next-generation APU Ryzen 8000 (Zen 5) in 2H24F. We expect sales contribution per socket to rise 35-40% from US\$65-70 for the Ryzen 7000 series (Zen 4) to US\$90-95 for the Ryzen 8000 series due to its bigger die size, which is driven by higher NPU computing capability.

**Figure 3: AMD's Zen 5 NB APU silicon dollar content per socket is around 40% higher than that of Zen 4**

	Ryzen 7000 (Zen 4)	Ryzen 8000 (Zen 5)
Foundry	TSMC	TSMC
Node	N4	N4
Wafer sales contribution per socket to TSMC (US\$)	65-70	90-95
Incremental wafer revenue per socket (%)		35-40

Source: Company data, KGI Research estimates

## HPC silicon content analysis – Data center CPU & AI accelerator

**Data center CPU shows strongest silicon content growth of wafer revenue.** For x86 servers, AMD's server CPU shipments have been dominated by Milan in 2023, which is manufactured via TSMC's N7 process. However, we expect AMD's 2024 server CPU shipments to be dominated by Genoa, which is produced via TSMC's N5 process. In addition, we expect well over 50% of server product shipments to be based on N5 and N4 processes, and some products to be manufactured via the N3 process, which should further drive silicon content growth in 2024.

**Figure 4: AMD Genoa (Genoa-X) CPU silicon dollar content per socket almost 90% higher than Milan (Milan-X)**

	Milan	Genoa	Milan-X	Genoa-X
Foundry	TSMC	TSMC	TSMC	TSMC
CCD numbers (units)	8	12	8	12
Wafer sales contribution per socket to TSMC (US\$)	220-225	415-420	305-310	575-580
Incremental wafer revenue per socket (%)		85-90		85-90

Source: Company data, KGI Research estimates

**AMD & Nvidia AI accelerators also driving significant silicon content growth.** AI server demand has been significantly rising since May, which has driven the deployment of more powerful AI accelerators, such as H100, MI 300 and Google's (US) TPU, which could boost silicon content growth. We think production of Nvidia's (US) H100 will continue to ramp-up in 2024, and we expect H100 GPU shipments to grow over 200% in 2024. In addition, GH200 will enter mass production in 2024F, and Nvidia will also launch its B100 GPU in 2H24F. Based on our understanding, B100 GPU utilizes a chiplet architecture and the N4 process, which could further drive silicon content growth. Overall, with MI 300 and H100 continuing to ramp-up, and production of more powerful products set to ramp-up in late 2024, we expect HPC and AI to be meaningful silicon content growth drivers for TSMC in 2024.

**Figure 5: Wafer sales contribution per socket from MI 300 around 20% higher than that of MI 250**

	MI 250 (CDNA 2)	MI 300 (CDNA 3)		
	GCD	CCD	XCD	AID
Foundry	TSMC	TSMC	TSMC	TSMC
Node	N5	N5	N5	N6
Die count (unit)	25	3	6	4
Wafer sales contribution per socket to TSMC (US\$)	700-750		850-900	
Incremental sales per socket (%)			-20	

Source: Company data, KGI Research estimates

**Figure 6: Silicon dollar content per socket has averaged around 20% from GA100 to GB100**

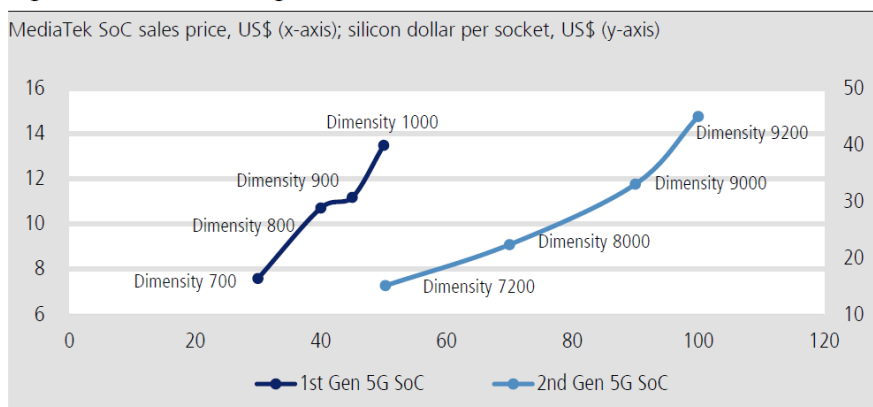
	GA100 (Ampere)	GH100 (Hopper)	GB100 (Blackwell)
Foundry	TSMC	TSMC	TSMC
Node	N7	N4	N4
Wafer sales contribution per socket to TSMC (US\$)	460-465	570-600	650-700
Incremental wafer revenue per socket (%)		25-30	10-15

Source: Company data, KGI Research estimates

### Node migration for 5G smartphone SoC still a healthy driver of silicon content

MediaTek announced its flagship 5G smartphone SoC (TSMC's N3 process) has taped-out, and will enter mass production in 2H24F. More importantly, we think most of MediaTek's 2023 smartphone SoC shipments are being manufactured via TSMC's N7 and N6 processes (Dimensity 700, 800, 900, & 1000), however, we believe in 2024F, most smartphone SoC shipments will be produced via N5 and N4 processes (Dimensity 7200, 8000, 9000, & 9200), which will boost silicon content growth. Qualcomm's Snapdragon 8 Gen 3, which is produced via the N4 process, will enter mass production in 4Q23F. Based on our calculations, Snapdragon 8 Gen 3 silicon content per socket will increase by around 25-30% compared to the Snapdragon 8 Gen 2 due to its larger die size. Therefore, we thus believe silicon content growth for smartphones will continue to be a strong driver of wafer sales contribution, in addition to smartphone end demand recovery in 2024F.

**Figure 7: Silicon dollar content for MediaTek's second-generation 5G SoC is 2-3x higher than that of first-generation 5G SoC**



Source: Company data, KGI Research estimates

**Figure 8: Qualcomm Snapdragon 8 Gen 3 silicon content is 25% higher than that of Snapdragon 8 Gen 2**

	Snapdragon 8 Gen 2	Snapdragon 8 Gen 3
Foundry	TSMC	TSMC
Node	N4	N4
Wafer sales contribution per socket to TSMC (US\$)	40-45	50-55
Incremental sales per generation (%)		25-30

Source: Company data, KGI Research estimates

**Figure 9: Breakdown of 3Q-4Q23 forecast revisions vs. consensus**

NT\$m	3Q23F							4Q23F						
	Revision	Previous	Chg. (%)	QoQ (%)	YoY (%)	Consensus	Diff. (%)	Revision	Previous	Chg. (%)	QoQ (%)	YoY (%)	Consensus	Diff. (%)
Revenue	546,303	530,793	2.9	13.6	(10.9)	531,445	2.8	600,662	580,036	3.6	10.0	(4.0)	581,590	3.3
Gross profit	290,817	280,690	3.6	11.8	(21.5)	280,162	3.8	312,093	289,728	7.7	7.3	(19.8)	302,514	3.2
Operating profit	218,979	213,014	2.8	8.4	(29.4)	212,564	3.0	234,908	217,224	8.1	7.3	(27.7)	230,175	2.1
Net profit	187,659	182,589	2.8	3.2	(33.2)	187,717	(0.0)	201,199	186,167	8.1	7.2	(32.0)	202,150	(0.5)
EPS (NT\$)	7.24	7.04	2.8	3.2	(33.2)	7.23	0.0	7.76	7.18	8.1	7.2	(32.0)	7.81	(0.6)
Gross margin (%)	53.2	52.9	0.4 ppts	(0.9)ppts	(7.2)ppts	52.7	0.5 ppts	52.0	50.0	2.0 ppts	(1.3)ppts	(10.3)ppts	52.0	(0.1)ppts
OP margin (%)	40.1	40.1	(0.0)ppts	(1.9)ppts	(10.5)ppts	40.0	0.1 ppts	39.1	37.5	1.7 ppts	(1.0)ppts	(12.9)ppts	39.6	(0.5)ppts
Net margin (%)	34.4	34.4	(0.0)ppts	(3.5)ppts	(11.5)ppts	35.3	(1.0)ppts	33.5	32.1	1.4 ppts	(0.9)ppts	(13.8)ppts	34.8	(1.3)ppts

Source: Bloomberg, KGI Research estimates

Figure 10: Breakdown of 2023-24 forecast revisions vs. consensus

NT\$m	2023F						2024F					
	Revision	Previous	Chg. (%)	YoY (%)	Consensus	Diff. (%)	Revision	Previous	Chg. (%)	YoY (%)	Consensus	Diff. (%)
Revenue	2,136,439	2,100,303	1.7	(5.6)	2,099,221	1.8	2,699,401	2,524,641	6.9	26.4	2,565,336	5.2
Gross profit	1,149,610	1,117,119	2.9	(14.7)	1,131,333	1.6	1,481,651	1,356,128	9.3	28.9	1,377,047	7.6
Operating profit	887,082	863,434	2.7	(20.9)	876,168	1.2	1,167,978	1,092,406	6.9	31.7	1,083,856	7.8
Net profit	777,643	757,542	2.7	(23.5)	776,818	0.1	1,012,830	948,593	6.8	30.2	950,108	6.6
EPS (NT\$)	29.99	29.22	2.7	(23.5)	29.99	0.0	39.06	36.58	6.8	30.2	36.71	6.4
Gross margin (%)	53.8	53.2	0.6 ppts	(5.7)ppts	53.9	(0.1)ppts	54.9	53.7	1.2 ppts	1.1 ppts	53.7	1.2 ppts
OP margin (%)	41.5	41.1	0.4 ppts	(8.0)ppts	41.7	(0.2)ppts	43.3	43.3	(0.0)ppts	1.7 ppts	42.3	1.0 ppts
Net margin (%)	36.4	36.1	0.3 ppts	(8.5)ppts	37.0	(0.6)ppts	37.5	37.6	(0.1)ppts	1.1 ppts	37.0	0.5 ppts

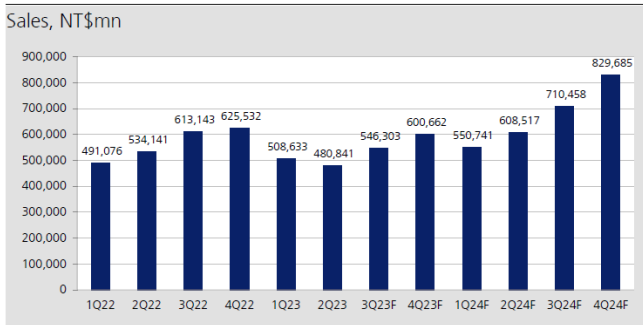
Source: Bloomberg, KGI Research estimates

**Figure 11: Company profile**

Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest dedicated semiconductor foundry, has increased its market share in recent years. Capacity exceeded 16mn 8-inch equivalent wafers in 2013. TSMC operates six advanced 300mm wafer fabs, six 8-inch wafer fabs and one 6-inch wafer fab, and is building a new 300mm wafer fab. The company provides the following services: wafer manufacturing, wafer probing, assembly and testing, mask production, and design services.

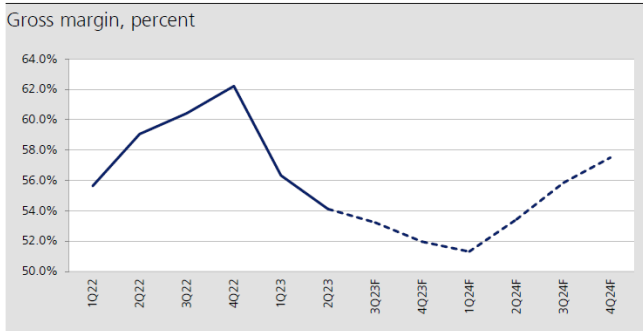
Source: Company data, KGI Research

**Figure 13: Sales**



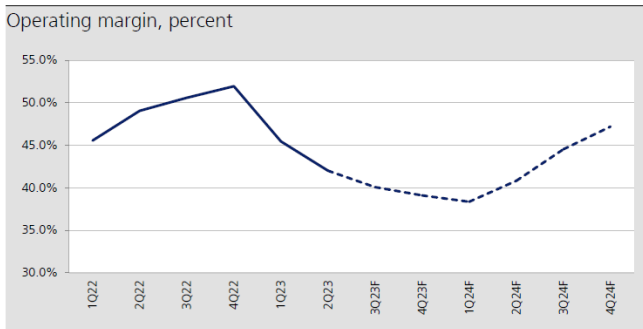
Source: KGI Research

**Figure 15: Gross Margin**



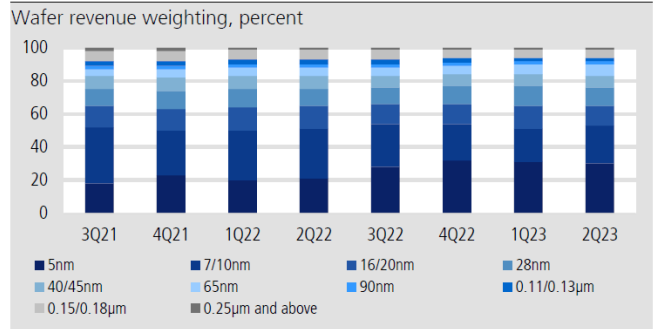
Source: KGI Research

**Figure 17: Operating Margin**



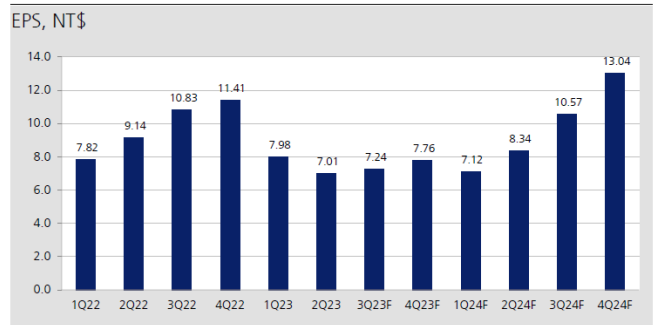
Source: KGI Research

**Figure 12: TSMC's wafer revenue by node**



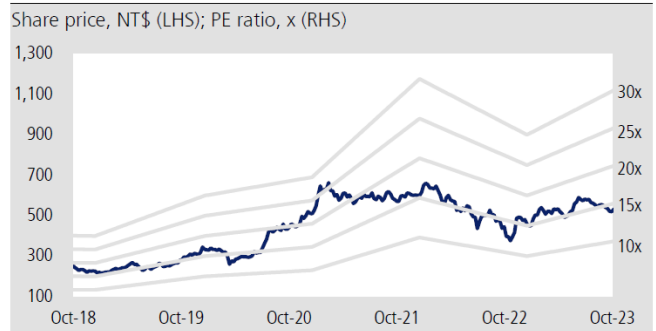
Source: Company data, KGI Research

**Figure 14: EPS**



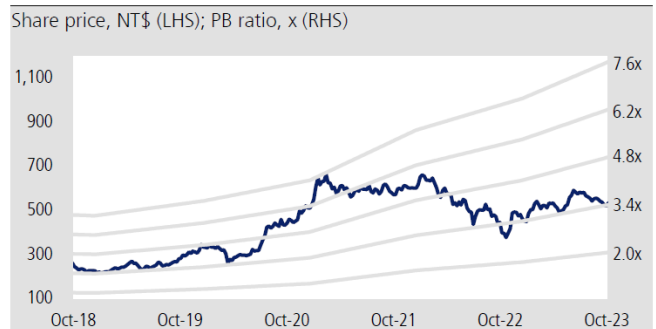
Source: KGI Research

**Figure 16: 12M forward PE band**



Source: TEJ, KGI Research estimates

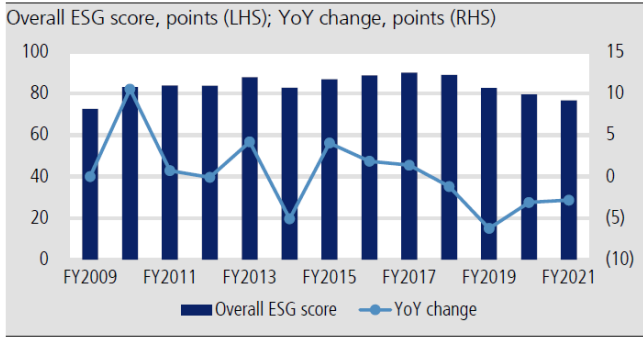
**Figure 18: 12M forward PB band**



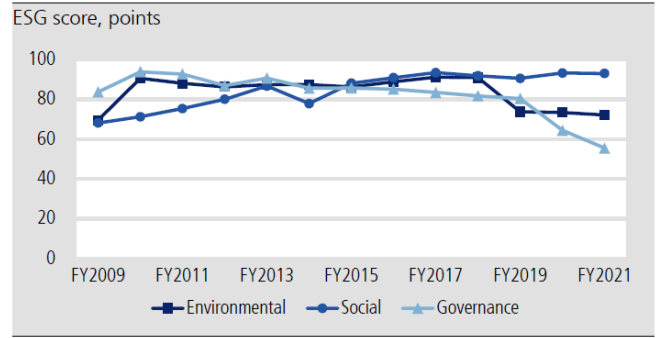
Source: TEJ, KGI Research estimates



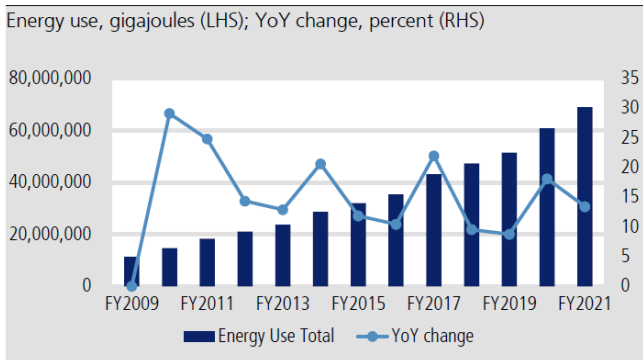
**Figure 19: Overall ESG score**



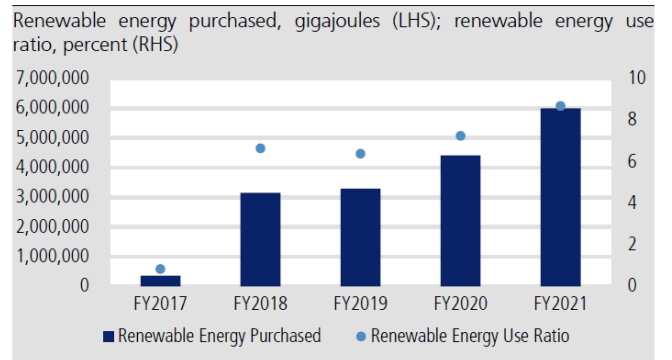
**Figure 20: ESG score by category**



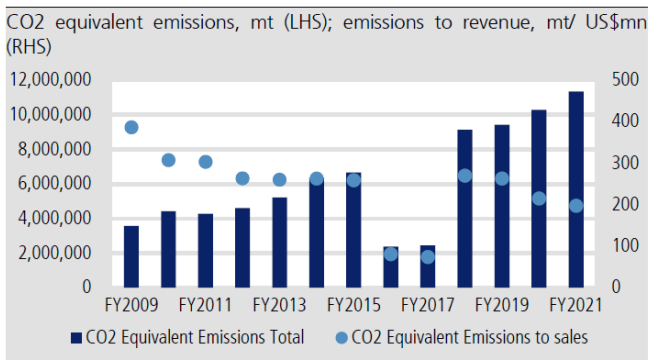
**Figure 21: Energy use**



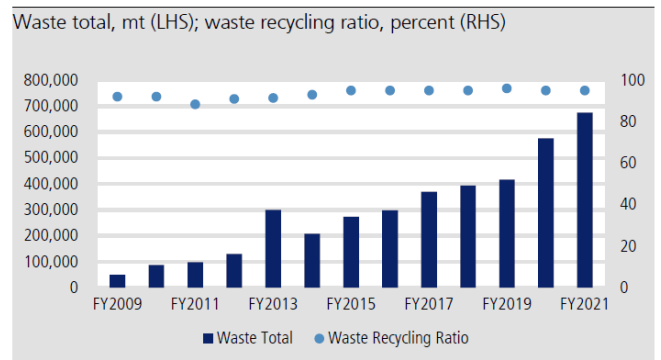
**Figure 22: Renewable energy**



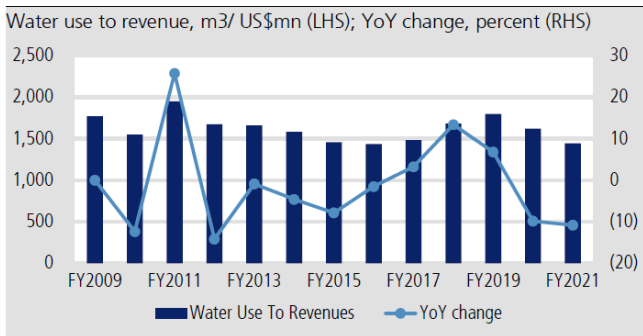
**Figure 23: CO2 equivalent emissions**



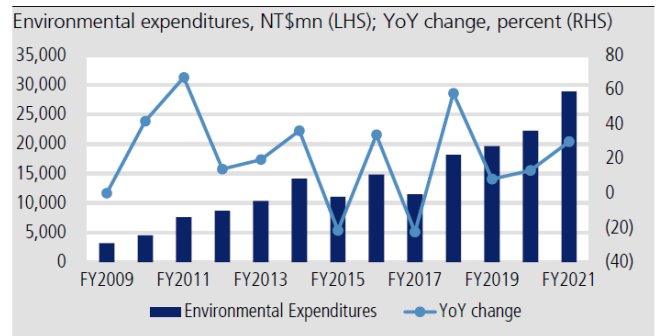
**Figure 24: Waste total**



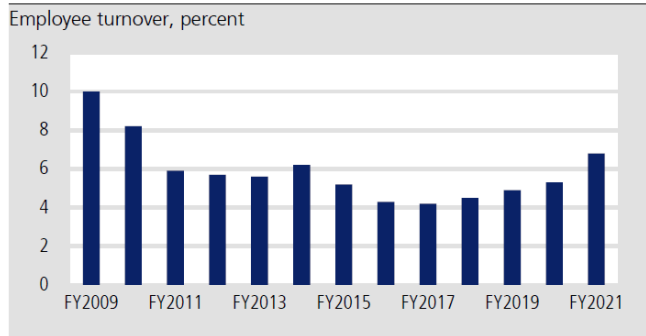
**Figure 25: Water use to revenue**



**Figure 26: Environmental expenditures**

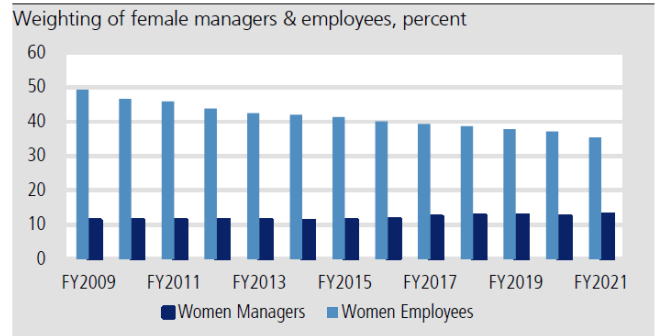


**Figure 27: Employee turnover**



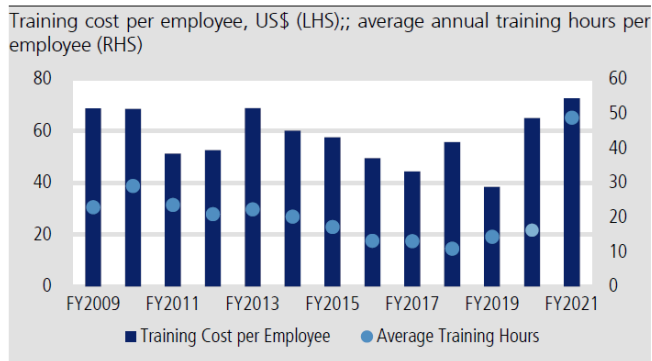
Source: Refinitiv, Company data

**Figure 28: Gender diversification**



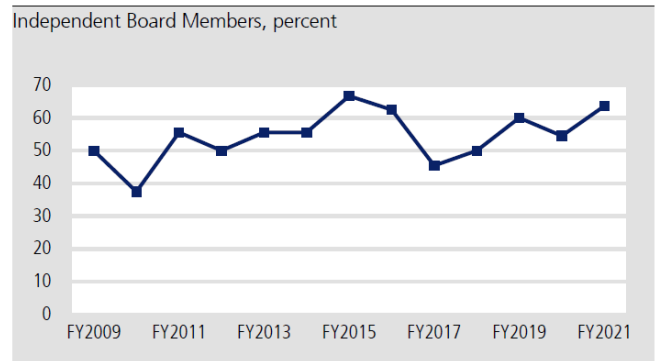
Source: Refinitiv, Company data

**Figure 29: Employee training**



Source: Refinitiv, Company data

**Figure 30: Independent Board Members**



Source: Refinitiv, Company data



## ESG chart definition

Item	Definition	Remarks
Energy use	<p>Total direct and indirect energy consumption in gigajoules.</p> <ul style="list-style-type: none"> <li>- the total amount of energy that has been consumed within the boundaries of the company's operations</li> <li>- total energy use = total direct energy consumption + indirect energy consumption</li> <li>- purchased energy and produced energy are included in total energy use</li> <li>- for utilities, transmission/ grid loss as part of its business activities is considered as total energy consumed and data does not consider electricity produced to answer energy use (utility company produces to sell)</li> <li>- for utilities, raw materials such as coal, gas or nuclear used in the production of energy are not considered under 'total energy use'</li> </ul>	
Renewable energy purchased	<p>Total primary renewable energy purchased in gigajoules.</p> <ul style="list-style-type: none"> <li>- energy consumed by the company from various sources and among the purchased energy, how much energy is renewable in nature (solar, wind, hydro, biomass, geothermal) are in scope</li> <li>- if there is no evidence that renewable energy is produced by the company, then we consider the reported energy figure as renewable energy purchased</li> </ul>	
Renewable energy use ratio	Renewable energy to total energy used	
CO2 equivalent emissions	<p>Direct CO2 and CO2 equivalent emissions in metric tons.</p> <ul style="list-style-type: none"> <li>- direct emissions from sources that are owned or controlled by the company (scope 1 emissions)</li> <li>- following gases are relevant: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorinated compound (PFCS), sulfur hexafluoride (SF6), nitrogen trifluoride (NF3)</li> </ul>	
CO2 equivalent emissions to sales	<p>Direct CO2 and CO2 equivalent emissions (metric tons) to sales (NT\$mn)</p> <ul style="list-style-type: none"> <li>- direct emissions from sources that are owned or controlled by the company (scope 1 emissions)</li> <li>- following gases are relevant: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorinated compound (PFCS), sulfur hexafluoride (SF6), nitrogen trifluoride (NF3)</li> </ul>	
Waste total	<p>Total amount of waste produced in metric tons.</p> <ul style="list-style-type: none"> <li>- total waste = non-hazardous waste + hazardous waste</li> <li>- only solid waste is taken into consideration, exceptionally if liquid waste is reported in metric tons, then we do the summation to derive total including liquid waste</li> <li>- for sectors like mining, oil &amp; gas, waste generation like tailings, waste rock, coal and fly ash are also considered</li> </ul>	
Waste recycling ratio	<p>The waste recycling ratio as reported by the company.</p> <ul style="list-style-type: none"> <li>- waste recycling ratio = waste recycled/total waste*100</li> <li>- waste to energy or waste incinerated with energy recovery are considered as waste recycled</li> <li>- waste recovered via composting is considered as recycled waste</li> </ul>	
Water withdrawal total	<p>Total water withdrawal in cubic meters.</p> <ul style="list-style-type: none"> <li>- the total volume of water withdrawn from any water source that was either withdrawn directly by the reporting organization or through intermediaries such as water utilities</li> <li>- different sources of water like wells, town/utility/municipal water, river water, and surface water are considered</li> </ul>	
Environmental expenditures	<p>Total amount of environmental expenditures.</p> <ul style="list-style-type: none"> <li>- all environmental investment &amp; expenditures for environmental protection or to prevent, reduce, control environmental aspects, impacts, and hazards. It also includes disposal, treatment, sanitation, and clean-up expenditures</li> </ul>	
Turnover of employees	<p>Percentage of employee turnover.</p> <ul style="list-style-type: none"> <li>- includes employees who left the company for any reason (voluntary or involuntary), such as resignations, retirement, natural departure/death, medical incapacitation, redundancy, layoffs, restructuring, dismissal, retrenchment or end of a fixed-term contract</li> <li>- employees turnover rate = (employees leaving/average number of employees)*100</li> <li>- where the average number of employees = (employees at the end of the current year + employees at the end of the previous year)/2</li> <li>- employees at the end of the current fiscal year = employees at the end of the previous fiscal year + new employees - employees leaving</li> </ul>	
Women managers	<p>Percentage of women managers.</p> <ul style="list-style-type: none"> <li>- percentage of women managers among total managers of the company</li> <li>- if there is a breakdown by category in percentage, such as top, senior, middle, and junior management, then we consider the percentage of middle women managers</li> <li>- percentage of women managers = number of women managers/total number of managers*100</li> </ul>	
Women employees	<p>Percentage of women employees.</p> <ul style="list-style-type: none"> <li>- percentage of women employees to the total number of employees of the company</li> <li>- percentage of women employees = number of women/total number of employees*100</li> </ul>	
Training hours total	<p>Total training hours performed by all employees.</p> <ul style="list-style-type: none"> <li>- consider only employee training hours</li> <li>- includes all types of training given to general employees (such as health &amp; safety, environmental, emergency response, skills &amp; career development training)</li> <li>- if the value is given in days, multiply by 8, assuming that 1 day = 8 hours worked</li> </ul>	
Training hours per employee	Training hours per employee per year	

Source: Refinitiv; Company data, KGI Research

## Income statement

	Quarterly								Annually		
	Mar-23A	Jun-23A	Sep-23F	Dec-23F	Mar-24F	Jun-24F	Sep-24F	Dec-24F	Dec-22A	Dec-23F	Dec-24F
<b>Income statement (NT\$m)</b>											
<b>Revenue</b>	<b>508,633</b>	<b>480,841</b>	<b>546,303</b>	<b>600,662</b>	<b>550,741</b>	<b>608,517</b>	<b>710,458</b>	<b>829,685</b>	<b>2,263,891</b>	<b>2,136,439</b>	<b>2,699,401</b>
Cost of goods sold	(222,133)	(220,641)	(255,485)	(288,570)	(268,167)	(283,388)	(313,704)	(352,492)	(915,536)	(986,829)	(1,217,751)
<b>Gross profit</b>	<b>286,500</b>	<b>260,200</b>	<b>290,817</b>	<b>312,093</b>	<b>282,575</b>	<b>325,129</b>	<b>396,754</b>	<b>477,194</b>	<b>1,348,355</b>	<b>1,149,610</b>	<b>1,481,651</b>
Operating expenses	(55,262)	(58,147)	(71,839)	(77,185)	(71,321)	(76,612)	(80,282)	(85,458)	(227,076)	(262,528)	(313,673)
<b>Operating profit</b>	<b>231,238</b>	<b>202,053</b>	<b>218,979</b>	<b>234,908</b>	<b>211,254</b>	<b>248,516</b>	<b>316,472</b>	<b>391,736</b>	<b>1,121,279</b>	<b>887,082</b>	<b>1,167,978</b>
Depreciation of fixed assets	(108,083)	(121,644)	(175,447)	(146,764)	(152,328)	(156,387)	(160,476)	(154,923)	(428,498)	(551,939)	(624,113)
Amortisation of intangible assets	(2,239)	(2,296)	(3,739)	(2,803)	(3,031)	(3,076)	(3,420)	(2,959)	(8,756)	(11,077)	(12,486)
<b>EBITDA</b>	<b>341,561</b>	<b>325,992</b>	<b>398,165</b>	<b>384,475</b>	<b>366,613</b>	<b>407,979</b>	<b>480,368</b>	<b>549,617</b>	<b>1,558,533</b>	<b>1,450,099</b>	<b>1,804,578</b>
Interest income	13,618	13,672	1,000	1,000	4,100	4,100	4,100	4,100	22,422	29,290	16,400
Investment income	1,111	1,062	1,500	1,500	2,500	2,500	2,500	2,500	8,065	5,173	10,000
Other non-op income	16	310	-	-	-	-	-	-	681	326	-
<b>Non-operating income</b>	<b>14,745</b>	<b>15,044</b>	<b>2,500</b>	<b>2,500</b>	<b>6,600</b>	<b>6,600</b>	<b>6,600</b>	<b>6,600</b>	<b>31,168</b>	<b>34,788</b>	<b>26,400</b>
Interest expense	(2,964)	(3,005)	(800)	(800)	(800)	(800)	(800)	(800)	(11,750)	(7,569)	(3,200)
Investment loss	-	-	-	-	-	-	-	-	-	-	-
Other non-op expenses	1,256	678	-	-	-	-	-	-	3,494	1,934	-
<b>Non-operating expenses</b>	<b>(1,708)</b>	<b>(2,327)</b>	<b>(800)</b>	<b>(800)</b>	<b>(800)</b>	<b>(800)</b>	<b>(800)</b>	<b>(800)</b>	<b>(8,256)</b>	<b>(5,635)</b>	<b>(3,200)</b>
<b>Pre-tax profit</b>	<b>244,275</b>	<b>214,769</b>	<b>220,679</b>	<b>236,608</b>	<b>217,054</b>	<b>254,316</b>	<b>322,272</b>	<b>397,536</b>	<b>1,144,191</b>	<b>916,236</b>	<b>1,191,178</b>
Current taxation	(37,326)	(32,958)	(33,102)	(35,491)	(32,558)	(38,147)	(48,341)	(59,630)	(127,290)	(138,877)	(178,677)
Minorities	38	82	82	82	82	82	82	82	(370)	284	328
<b>Normalised net profit</b>	<b>206,986</b>	<b>181,894</b>	<b>187,659</b>	<b>201,199</b>	<b>184,578</b>	<b>216,251</b>	<b>274,013</b>	<b>337,988</b>	<b>1,016,530</b>	<b>777,643</b>	<b>1,012,830</b>
Extraordinary items	0	(94)	-	-	-	-	-	-	-	-	-
<b>Net profit</b>	<b>206,987</b>	<b>181,799</b>	<b>187,659</b>	<b>201,199</b>	<b>184,578</b>	<b>216,251</b>	<b>274,013</b>	<b>337,988</b>	<b>1,016,530</b>	<b>777,643</b>	<b>1,012,830</b>
EPS (NT\$)	7.98	7.01	7.24	7.76	7.12	8.34	10.57	13.04	39.20	29.99	39.06
<b>Margins (%)</b>											
Gross profit margin	56.3	54.1	53.2	52.0	51.3	53.4	55.8	57.5	59.6	53.8	54.9
Operating margin	45.5	42.0	40.1	39.1	38.4	40.8	44.5	47.2	49.5	41.5	43.3
EBITDA margin	67.2	67.8	72.9	64.0	66.6	67.0	67.6	66.2	68.8	67.9	66.9
Pretax profit margin	48.0	44.7	40.4	39.4	39.4	41.8	45.4	47.9	50.5	42.9	44.1
Net profit margin	40.7	37.8	34.4	33.5	33.5	35.5	38.6	40.7	44.9	36.4	37.5
<b>Sequential growth (%)</b>											
Revenue growth	(18.7)	(5.5)	13.6	10.0	(8.3)	10.5	16.8	16.8			
Gross profit growth	(26.4)	(9.2)	11.8	7.3	(9.5)	15.1	22.0	20.3			
Operating profit growth	(28.9)	(12.6)	8.4	7.3	(10.1)	17.6	27.3	23.8			
EBITDA growth	(21.0)	(4.6)	22.1	(3.4)	(4.6)	11.3	17.7	14.4			
Pretax profit growth	(27.0)	(12.1)	2.8	7.2	(8.3)	17.2	26.7	23.4			
Net profit growth	(30.0)	(12.2)	3.2	7.2	(8.3)	17.2	26.7	23.3			
<b>YoY growth (%)</b>											
Revenue growth	3.6	(10.0)	(10.9)	(4.0)	8.3	26.6	30.0	38.1	42.6	(5.6)	26.4
Gross profit growth	4.9	(17.5)	(21.5)	(19.8)	(1.4)	25.0	36.4	52.9	64.5	(14.7)	28.9
Operating profit growth	3.3	(22.9)	(29.4)	(27.7)	(8.6)	23.0	44.5	66.8	72.5	(20.9)	31.7
EBITDA growth	2.0	(13.1)	(4.2)	(11.1)	7.3	25.1	20.6	43.0	45.3	(7.0)	24.4
Pretax profit growth	7.7	(19.3)	(30.3)	(29.3)	(11.1)	18.4	46.0	68.0	72.5	(19.9)	30.0
Net profit growth	2.1	(23.3)	(33.2)	(32.0)	(10.8)	19.0	46.0	68.0	70.4	(23.5)	30.2

Source: Company data, KGI Research estimates

**Balance sheet**

NT\$m	Dec-20A	Dec-21A	Dec-22A	Dec-23F	Dec-24F
<b>Total assets</b>	<b>2,760,711</b>	<b>3,725,503</b>	<b>4,964,779</b>	<b>5,394,177</b>	<b>6,128,113</b>
<b>Current assets</b>	<b>1,092,185</b>	<b>1,607,073</b>	<b>2,052,897</b>	<b>2,074,143</b>	<b>2,601,826</b>
Cash & ST securities	791,477	1,188,456	1,561,486	1,534,845	1,915,214
Inventory	137,353	193,102	221,149	258,417	315,660
Accounts receivable	146,038	198,301	231,340	236,233	326,305
Other current assets	17,317	27,214	38,922	44,648	44,648
<b>Non-current assets</b>	<b>1,668,526</b>	<b>2,118,431</b>	<b>2,911,882</b>	<b>3,320,034</b>	<b>3,526,287</b>
LT investments	27,728	29,385	68,928	97,610	107,610
Net fixed assets	1,555,589	1,975,119	2,693,837	2,821,370	3,017,623
Other assets	85,209	113,927	149,117	401,054	401,054
<b>Total liabilities</b>	<b>910,089</b>	<b>1,554,770</b>	<b>2,004,290</b>	<b>1,942,458</b>	<b>1,974,714</b>
<b>Current liabilities</b>	<b>617,151</b>	<b>739,503</b>	<b>944,227</b>	<b>809,290</b>	<b>841,546</b>
Accounts payable	41,095	48,723	56,522	72,448	88,497
Interest bearing ST liabilities	91,159	119,488	19,314	8,126	8,126
Other current liabilities	484,897	571,293	868,391	728,716	744,924
<b>Non-current liabilities</b>	<b>292,938</b>	<b>815,267</b>	<b>1,060,063</b>	<b>1,133,168</b>	<b>1,133,168</b>
Long-term debt	256,073	613,380	839,096	899,886	899,886
Other L-T liabilities	16,305	181,123	191,203	225,846	225,846
<b>Total equity</b>	<b>1,850,622</b>	<b>2,170,733</b>	<b>2,960,489</b>	<b>3,451,719</b>	<b>4,153,399</b>
Share capital	259,304	259,304	259,304	259,321	259,321
Retained earnings reserve	1,235,280	1,536,379	2,323,223	3,105,785	3,807,465
Minority interests	965	2,447	14,836	16,718	16,718
Preferred shareholders funds	-	-	-	-	-

**Key ratios**

	Dec-20A	Dec-21A	Dec-22A	Dec-23F	Dec-24F
<b>Growth</b>					
Revenue growth	25.2%	18.5%	42.6%	(5.6%)	26.4%
Operating profit growth	52.1%	14.7%	72.5%	(20.9%)	31.7%
EBITDA growth	36.2%	19.4%	45.3%	(7.0%)	24.4%
Net profit growth	50.0%	15.2%	70.4%	(23.5%)	30.2%
EPS growth	50.0%	15.2%	70.4%	(23.5%)	30.2%
<b>Profitability</b>					
Gross profit margin	53.1%	51.6%	59.6%	53.8%	54.9%
Operating margin	42.3%	40.9%	49.5%	41.5%	43.3%
EBITDA margin	67.1%	67.6%	68.8%	67.9%	66.9%
Net profit margin	38.7%	37.6%	44.9%	36.4%	37.5%
Return on average assets	20.6%	18.4%	23.4%	15.0%	17.6%
Return on average equity	29.8%	29.7%	39.8%	24.4%	26.8%
<b>Stability</b>					
Gross debt to equity	18.8%	33.8%	29.0%	26.3%	21.9%
Net debt to equity	Net cash	Net cash	Net cash	Net cash	Net cash
Interest coverage (x)	281.9	123.5	98.4	122.1	373.2
Interest & ST debt coverage (x)	0.9	0.8	1.0	1.0	1.0
Cash flow interest coverage(x)	395.2	205.4	137.1	158.1	476.4
Cash flow/int. & ST debt (x)	8.8	8.9	51.8	76.2	134.6
Current ratio (x)	1.8	2.2	2.2	2.6	3.1
Quick ratio (x)	1.5	1.9	1.9	2.2	2.7
Net debt (NT\$m)	(312,939)	(332,122)	(484,404)	(413,601)	(793,970)
<b>Per share data</b>					
EPS (NT\$)	19.97	23.01	39.20	29.99	39.06
CFPS (NT\$)	31.73	42.89	62.12	46.14	58.79
BVPS (NT\$)	71.33	83.62	113.60	132.48	159.54
Adj BVPS (NT\$)	71.33	83.62	113.60	132.48	159.54
SPS (NT\$)	51.65	61.22	87.31	82.40	104.11
EBITDA/share (NT\$)	34.65	41.36	60.11	55.93	69.60
Cash DPS (NT\$)	10.00	11.00	11.00	12.00	13.00
<b>Activity</b>					
Sales / avg assets	0.53	0.49	0.52	0.41	0.47
Days receivable	39.9	45.6	37.3	40.4	44.2
Days inventory	80.0	91.8	88.2	95.6	94.9
Days payable	23.9	23.2	22.5	26.8	26.6
Cash cycle	96.0	114.2	102.9	109.1	112.5

Source: Company data, KGI Research estimates

**Profit & loss**

NT\$m	Dec-20A	Dec-21A	Dec-22A	Dec-23F	Dec-24F
<b>Revenue</b>	<b>1,339,255</b>	<b>1,587,415</b>	<b>2,263,891</b>	<b>2,136,439</b>	<b>2,699,401</b>
Cost of goods sold	(628,125)	(767,878)	(915,536)	(986,829)	(1,217,751)
<b>Gross profit</b>	<b>711,130</b>	<b>819,537</b>	<b>1,348,355</b>	<b>1,149,610</b>	<b>1,481,651</b>
Operating expenses	(144,346)	(169,556)	(227,076)	(262,528)	(313,673)
<b>Operating profit</b>	<b>566,784</b>	<b>649,981</b>	<b>1,121,279</b>	<b>887,082</b>	<b>1,167,978</b>
<b>Non-operating income</b>	<b>13,272</b>	<b>12,285</b>	<b>31,168</b>	<b>34,788</b>	<b>26,400</b>
Interest income	9,018	5,709	22,422	29,290	16,400
Investment income	4,230	5,965	8,065	5,173	10,000
Other non-op income	23	611	681	326	-
<b>Non-operating expenses</b>	<b>4,722</b>	<b>860</b>	<b>(8,256)</b>	<b>(5,635)</b>	<b>(3,200)</b>
Interest expense	(2,081)	(5,414)	(11,750)	(7,569)	(3,200)
Investment loss	-	-	-	-	-
Other non-op expenses	6,803	6,275	3,494	1,934	-
<b>Pre-tax profit</b>	<b>584,777</b>	<b>663,126</b>	<b>1,144,191</b>	<b>916,236</b>	<b>1,191,178</b>
Current taxation	(66,619)	(66,053)	(127,290)	(138,877)	(178,677)
Minorities	(273)	(533)	(370)	284	328
Extraordinary items	-	0	0	-	-
<b>Net profit</b>	<b>517,885</b>	<b>596,540</b>	<b>1,016,530</b>	<b>777,643</b>	<b>1,012,830</b>
<b>EBITDA</b>	<b>898,508</b>	<b>1,072,376</b>	<b>1,558,533</b>	<b>1,450,099</b>	<b>1,804,578</b>
EPS (NT\$)	19.97	23.01	39.20	29.99	39.06

**Cash flow**

NT\$m	Dec-20A	Dec-21A	Dec-22A	Dec-23F	Dec-24F
<b>Operations cash flow</b>	<b>822,666</b>	<b>1,112,161</b>	<b>1,610,599</b>	<b>1,196,275</b>	<b>1,524,370</b>
Net profit	517,885	596,540	1,016,530	777,643	1,012,830
Depreciation & amortisation	331,725	422,395	437,254	563,016	636,599
Decrease in working capital	(61,074)	(100,384)	(53,286)	(26,235)	(131,267)
Other operating cash flow	34,130	193,610	210,100	(118,149)	6,208
<b>Investing cash flow</b>	<b>(505,782)</b>	<b>(836,366)</b>	<b>(1,190,928)</b>	<b>(987,845)</b>	<b>(832,852)</b>
Sale of ST investment	49	4,676	(128,838)	(13,567)	-
New investments	-	-	-	-	-
Capital expenditure	(507,239)	(839,196)	(1,082,672)	(1,009,320)	(832,852)
Others investing cashflow	1,408	(1,846)	20,582	35,042	-
<b>Free cash flow</b>	<b>258,441</b>	<b>59,845</b>	<b>289,078</b>	<b>269,009</b>	<b>652,777</b>
<b>Financing cash flow</b>	<b>(88,615)</b>	<b>136,608</b>	<b>(200,244)</b>	<b>(233,682)</b>	<b>(311,150)</b>
Increase in short term debt	(31,572)	35,668	(111,960)	-	-
Increase in long term loans	206,535	362,765	195,983	49,601	-
New ordinary shares issued	-	-	-	-	-
Ordinary dividends paid	(259,304)	(265,786)	(285,234)	(285,223)	(311,150)
Other financing cashflow	(4,275)	3,961	1,839	1,940	-
<b>Forex effects</b>	<b>(23,498)</b>	<b>(7,584)</b>	<b>58,397</b>	<b>4,051</b>	<b>-</b>
<b>Total cash generated</b>	<b>204,771</b>	<b>404,820</b>	<b>277,824</b>	<b>(21,202)</b>	<b>380,369</b>

**ROIC**

	Dec-20A	Dec-21A	Dec-22A	Dec-23F	Dec-24F
1 - COGS/revenue					
- Operating exp./revenue	10.8%	10.7%	10.0%	12.3%	11.6%
<b>= Operating margin</b>	<b>42.3%</b>	<b>40.9%</b>	<b>49.5%</b>	<b>41.5%</b>	<b>43.3%</b>
1 / (Working capital/revenue	(0.2)	(0.1)	(0.2)	(0.1)	(0.1)
+ Net PPE/revenue	1.2	1.2	1.2	1.3	1.1
+ Other assets/revenue)	0.0	0.0	0.0	0.2	0.1
<b>= Capital turnover</b>	<b>1.0</b>	<b>0.9</b>	<b>1.0</b>	<b>0.7</b>	<b>0.8</b>
Operating margin	42.3%	40.9%	49.5%	41.5%	43.3%
x Capital turnover	1.0	0.9	1.0	0.7	0.8
x (1 - tax rate)	88.6%	90.0%	88.9%	84.8%	85.0%
<b>= After-tax ROIC</b>	<b>37.6%</b>	<b>32.9%</b>	<b>43.9%</b>	<b>25.4%</b>	<b>30.3%</b>

Source: Company data, KGI Research estimates

**TSMC – Recommendation & target price history**


Date	Rating	Target	Price
2023-07-20	Outperform	658	579
2023-07-04	Outperform	716	585
2023-04-14	Outperform	591	516
2023-03-29	Outperform	603	530
2023-03-29	Outperform	603	530
2022-10-31	Outperform	575	390
2022-09-27	Outperform	580	448
2022-08-19	Outperform	598	519
2022-07-14	Outperform	600	475
2022-07-05	Outperform	580	446

Source: TEJ, KGI Research

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