

Semi – China CIS sector

Solid auto CIS growth offset by weak mobile CIS demand

CIS market revenue was US\$21.3bn in 2022, stagnated with 0.2% YoY decline, according to Yole. The sales from mobile segment (US\$13.5bn) remained flat. Auto CIS sales grew 13.7% YoY to US\$2.2bn, surpassing Security CIS, which experienced significant decline (42.8% YoY) in the past year. Domestic CIS players took a strong hit by 1) the weak mobile/security demand, 2) slower-than-expected inventory digestion and 3) intensified competition among overseas and domestic peers. Looking forward, we expect 2023 CIS market revenue to maintain at US\$21.3bn, a result of continuous growth from auto/industrial/medical CIS offset by the ongoing weakness from mobile/security/consumer CIS. We maintain HOLD for Willsemi (603501CH).

- **Mobile CIS has continued to exhibit weakness, with significant repercussions for major domestic CIS players.** According to Counterpoint, smartphone shipment dropped by 11.7% in 2022, reaching 1.23bn units, and is expected to further decline to 1.15bn in 2023, potentially marking the lowest figure in a decade. The sluggish smartphone shipment dragged down mobile CIS shipment in 2022. However, overall sales remained unchanged, due to increasing mix of premium phones which drove up ASP. We expect mobile CIS sales to decelerate by another 2.5% YoY in 2023. As for competitiveness landscape, Sony gained significant share (5% according to Counterpoint), thanks to Apple's share expansion. Willsemi and GalaxyCore, both experienced significant decreases in mobile CIS sales, given their clients base from Android camp. The longer-than-expected inventory digestion eroded sales and margins significantly, in-line with our expectation. However, SmartSens (688213 CH) mobile grew its CIS business from a low base, as domestic smartphone manufacturers are expanding their suppliers. Weak mobile CIS demand will remain an overhang for Willsemi and GalaxyCore in the near term, unless there is a surge in consumer interest for new Android phones that could spark a market turnaround. We will watch closely on the smartphone shipment in 2H23/2024.
- **Auto CIS will maintain double-digit growth, taking up greater share in the CIS market.** For auto CIS, the market will continue to grow on 1) increasing adoption of ADAS, 2) transition from ordinary vehicles to electrified intelligent vehicles and 3) resolutions upgrade from current 1.2/1.7MP, which will drive up both sales units and ASP. As for the competitiveness landscape, On Semi regained significant share (>10%) in 2022, took back the shares lost due to chip shortages in the year before and strengthened its leadership in auto CIS market. The sales growth of the Company's auto sensing business was 32.2% YoY in 1H23 (vs. 87.5% in 2022), higher than Willsemi's (20.0%/55% in 1H23/2022), showing the market consolidated towards the leaders after severe semi shortage.
- **Security CIS sales is likely to slide further in 2023.** Yole estimated security CIS market plunged by more than 40% in 2022, which we think is affected by weak macro and delayed government procurement. Chinese CIS players lead the market and their security CIS sales were down dramatically in 2022 (SmartSens/Willsemi: -30.3%/-23.1% YoY). The weak demand continued into 1H23. We are conservative in near-term market outlook and expect demand to return once government procurement is resumed.
- As for our coverage, we maintain HOLD on Willsemi, as we expect de-stocking process is likely to persist till the end of the year, which will continue to hurt the Company's overall margin.

MARKET PERFORM (Maintain)

China Technology Sector

Lily Yang, Ph.D.

(852) 3916 3716

lilyyang@cmbi.com.hk

Kevin Zhang

(852) 3761 8727

kevinzhang@cmbi.com.hk

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CIS market review and outlook

CIS market revenue was US\$21.3bn in 2022, stagnated with 0.2% YoY decline, according to Yole. The result was better than our estimates in October, when we projected a 5% YoY decline as we expected auto CIS's strength cannot offset the handset weakness. [\(link\)](#) **We expect this year's global CIS market will remain flat and hopefully resume growth (likely single-digit) in 2024 and onwards.**

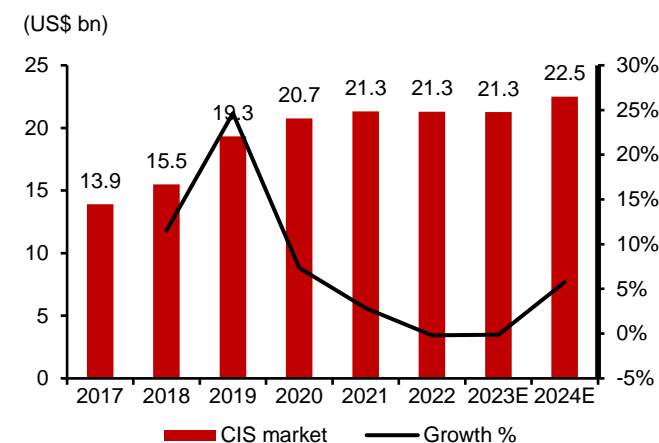
Mobile CIS sales were flat at US\$13.4bn in 2022, as the increase from avg. mobile CIS ASP offset the decline in shipment. **Similar trend will follow in 2023** and we estimated mobile CIS market will decrease by 5% YoY. **Recovery may come in 2024 after CIS inventory full digests and consumers' sentiment resumes.**

Auto CIS sales grew 13.7% YoY to US\$2.6bn in 2022, driven by increasing number of cameras per vehicle (increasing adoption of ADAS and transition from ordinary vehicles to electrified intelligent vehicles) and rising ASP (resolutions upgrade from current 1.2/1.7MP). We expect the trend will persist and support **auto CIS market to grow at double-digit in 2023/24E.**

Security CIS sales dropped dramatically in 2022 (down 42.8% YoY according to Yole), much lower than expectation. **The segment was affected by macroeconomics pressure, which is believed to persist in the near term. Demand will return once government procurement and enterprise spending are resumed.**

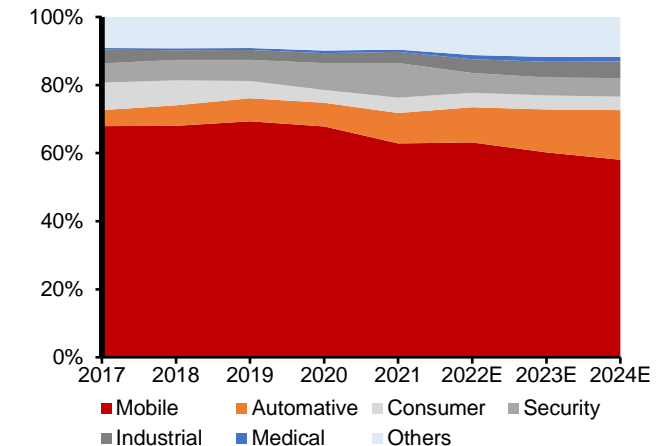
Although mobile CIS remains the largest segment (63% of total CIS sales), its share will continue to decrease in the following years. The share of auto and industrial CIS (10%/4%) are likely to expand on stronger growth. Medical CIS will also have double-digit growth, however, its contribution is less meaningful to the overall market growth since the current base is low (1% share).

Figure 1: CIS market revenue was US\$21.3bn in 2022, stagnated with 0.2% YoY decline



Source: Yole, CMBIGM estimates

Figure 2: Mobile CIS remains the largest segment while auto and industrial CIS to expand on higher growth



Source: Yole, CMBIGM estimates

Share consolidates to market dominants post semi shortage

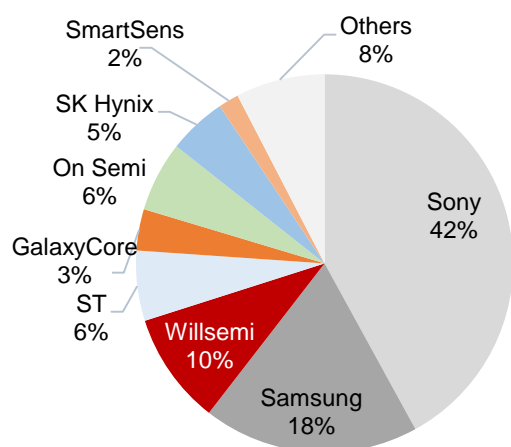
The CIS market has undergone significant changes over the past three years, and so too have its peers. When the industry confronted a chip shortage, we saw Chinese CIS players garnered market share gains, thanks to their robust supply chain capabilities and efficient operation management.

With a weakening demand landscape and a gradual easing of bottlenecks, Chinese CIS players faced challenges in the following areas: 1) decreased mobile/security demand, 2) slower-than-expected inventory digestion of mobile CIS and 3) intensified competition among overseas and domestic peers.

In sub-markets, market shares showed consolidation around dominant players, notably in the mobile and automotive CIS markets. Sony gained 5% in mobile CIS market during 2022, thanks to Apple's share expansion. On Semi gained more than 10% share in auto CIS market, while Willsemi gained 6% share.

Overall, Sony was the biggest winner in 2022, which recorded a 3.0% share gain. On Semi gained 1.8% share, mainly due to outperformed auto CIS sales. Conversely, Samsung, Willsemi, GalaxyCore and SmartSens all experienced share loss, largely driven by the sluggish mobile and security demand and prolonged inventory digestion in the channel.

Figure 3: Sony/On Semi/SK Hynix gained 3%/2%/2% shares while Samsung/Willsemi/GalaxyCore lost 4%/3%/1% shares in 2022



Source: Yole, CMBIGM estimates

Figure 4: Change in competitive dynamics during 2019-2022: Share consolidates to market dominants post semi shortage

Market share change%	2019	2020	2021	2022
Sony	3.3%	-3.6%	-0.2%	3.0%
Samsung	0.3%	1.0%	-0.4%	-3.5%
Willsemi	2.3%	2.9%	1.7%	-2.8%
GalaxyCore	0.7%	1.7%	0.2%	-0.8%
SmartSens	0.2%	0.6%	0.9%	-0.2%
OnSemi	-1.0%	-0.4%	0.7%	1.8%
Others	-5.8%	-2.3%	-2.9%	2.6%

Source: Company filings, Yole, Counterpoint, Bloomberg, CMBIGM estimates

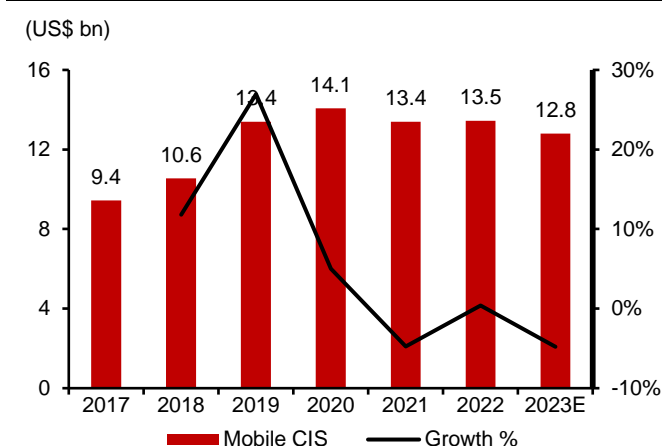
We maintain our HOLD rating on Willsemi (603501CH). TP is RMB85. The Company's 1H23 revenue and net profit were RMB8.9bn and RMB153mn, down 20% and 93% YoY, respectively. Margin continued to contract in 2Q23, suggesting the Company is making efforts to digest inventory. 2Q NP was negative again, failing to continue its profitability from 1Q. This has confirmed our previous prediction that "inventory digestion continues, however, not necessary a hint of market turnaround". ([link](#)) Looking forward, we think the de-stocking process is likely to persist till the end of the year, which will continue to hurt the Company's overall margin.

Mobile CIS

Mobile CIS market stagnated in 2022, with US\$13.5bn sales (vs. US\$13.4bn in 2021). This is mainly due to a mixed impact from sluggish smartphone shipment and increasing ASP. Per Counterpoint, smartphone shipment dropped by 11.7% YoY in 2022, reaching 1.23bn units. The decrease in smartphone shipment dragged down mobile CIS shipment in 2022. However, average mobile CIS ASP lifted, thanks to increasing mix of premium phone.

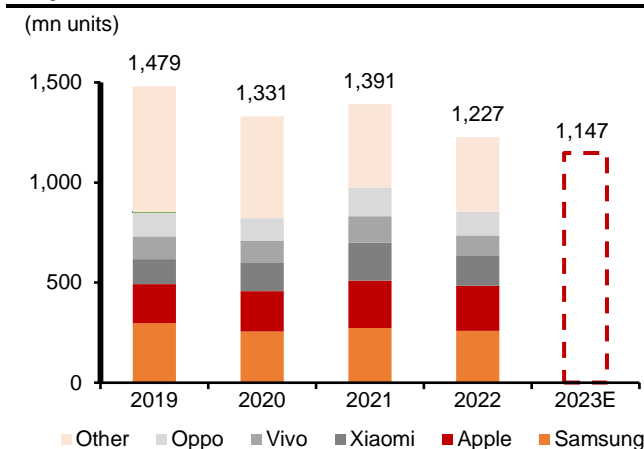
This year, smartphone shipment is expected to show another 6.4% YoY decline to 1.15bn, the lowest in a decade, according to Counterpoint. Although average ASP is likely to continue to increase, which helps to partially offset the decline from lower smartphone shipment, we expect the overall mobile CIS sales will drop by c.5% YoY in 2023.

Figure 5: Mobile CIS market stagnated in 2022 and is expected to remain weak in 2023E



Source: Yole, CMBIGM estimates

Figure 6: Counterpoint projected smartphone shipment will decline 6.4% YoY to 1.15bn in 2023

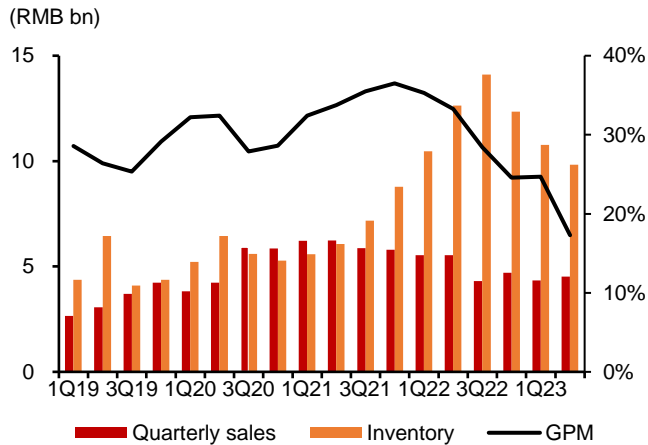


Source: Counterpoint, CMBIGM estimates

In 2022, Sony gained the most significant share, benefited by Apple's market share expansion. Counterpoint estimated a 5% share gain for the Company. On the other hand, Chinese CIS players got hurt the most.

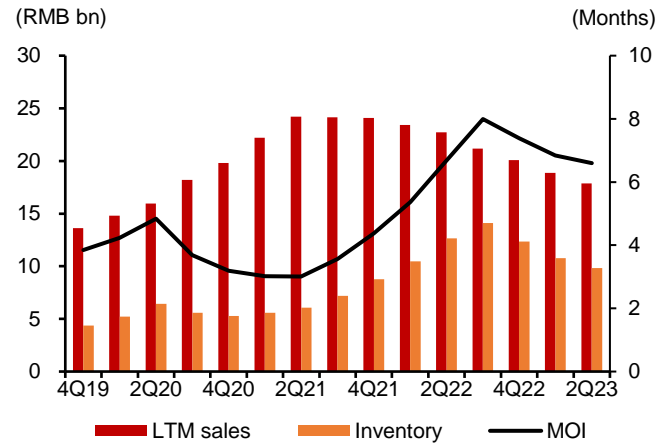
Willsemi and GalaxyCore's mobile CIS sales decreased by 48.1%/17% YoY and overall GPM was by 3.7% and 3.2% in 2022. This is mainly because their client base comes from Android camp. The longer-than-expected inventory digestion eroded sales and margins significantly, in-line with our expectation. SmartSens was the only company reported sales growth in mobile CIS business (180.6% YoY), from a low base in 2021, as domestic smartphone manufacturers are expanding their suppliers.

Figure 7: Willsemi's longer-than-expected inventory digestion eroded sales and margins significantly, in line with our expectations



Source: Company filings, CMBIGM estimates

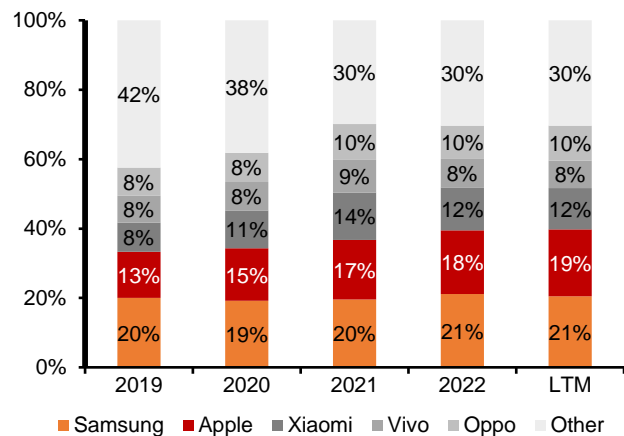
Figure 8: Willsemi's de-stocking will continue into 2H23



Source: Company filings, CMBIGM estimates

We expect weak mobile CIS demand will remain an overhang for Willsemi and GalaxyCore in the near term, unless there is overwhelming consumer interest for new Android phones to mark a market turnaround. We will watch closely on the smartphone shipment in 2H23/2024.

Figure 9: Apple steadily gained shares from Android camp in the past years



Source: Yole, CMBIGM estimates

Figure 10: Sony won 5% share in mobile CIS market in 2022, according to Counterpoint

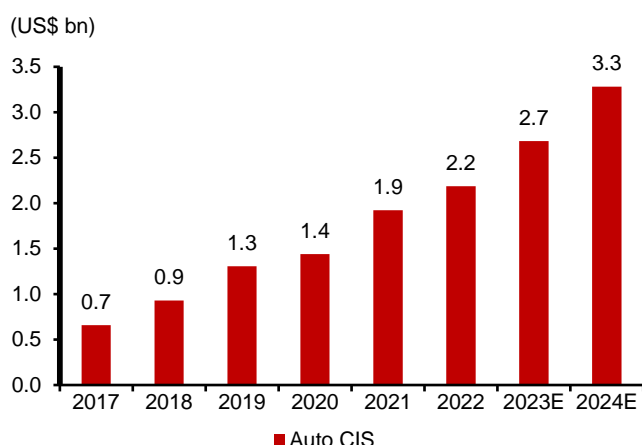
Market share change%	2020	2021	2022
Sony	-3.3%	3.3%	5.0%
Samsung	1.3%	-3.0%	-1.0%
Willsemi	4.3%	-0.3%	-5.4%
GalaxyCore	2.0%	0.4%	-1.1%
Others	-4.4%	-0.3%	2.5%

Source: Counterpoint, CMBIGM estimates

Auto CIS

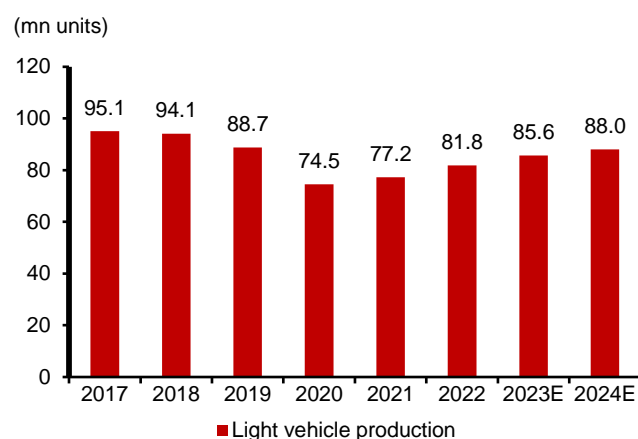
Auto CIS market continued its growth momentum in 2022. Sales rose to US\$2.2bn, with 13.7% growth YoY, according to Yole. We expect auto CIS market will maintain double-digit growth, taking up greater share in the CIS market.

Figure 11: Auto CIS market grew 13.7% YoY to US\$21.3bn in 2022



Source: Yole, CMBIGM estimates

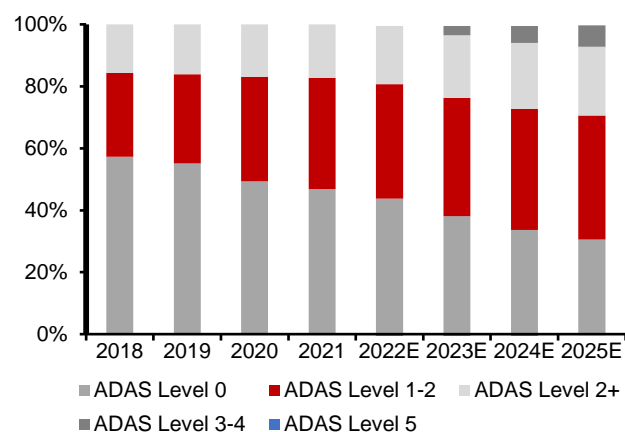
Figure 12: Global light vehicle production to grow 4.6% YoY



Source: S&P Mobility, CMBIGM estimates

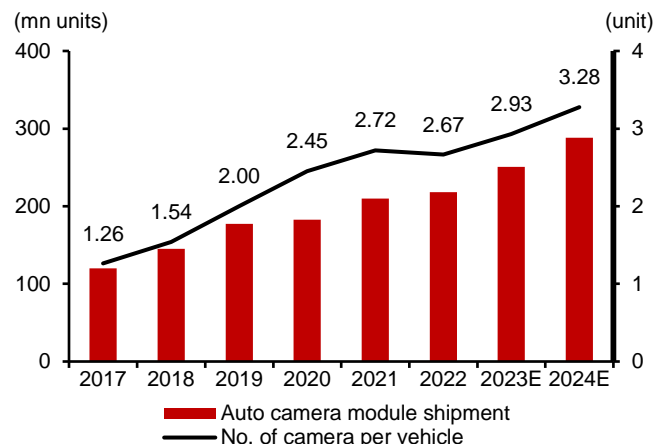
The growth is driven by increasing number of cameras per car as: 1) the transition from ordinary vehicles to electrified intelligent vehicles will require installation of a large number of cameras; 2) increasing adoption of ADAS and Autonomous Driving ("AD") demand and 3) resolutions upgrade from current 1.2/1.7MP.

Figure 13: ADAS penetration rate is expected to accelerate



Source: Yole, S&P Mobility, CMBIGM estimates

Figure 14: No. of camera per vehicle will continue to grow in 2024/25E



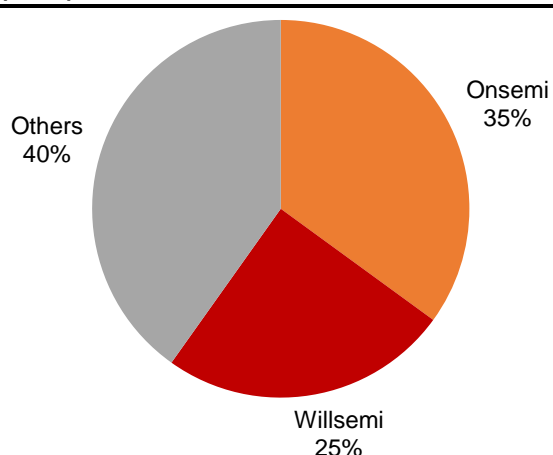
Source: Yole, S&P Mobility, CMBIGM estimates

We saw the same trend of share consolidation to the market leader in auto CIS market, similar to what happened in the mobile market, although the direct reasons are different. On semi lost more than 8% share in 2021, due to chip shortage. However, the Company regained more than 10% market share in 2022, after global supply chain constraints have eased. The growth of On Semi's auto sensing business continued in 2023, with 32.2% YoY increase in sales in 1H23, suggesting its leadership has further strengthened in auto CIS market.

Willsemi has also performed well in this market, taking share in the past two years. The Company's auto sensing sales grew 55% YoY in 2022 and another 20.0% YoY in 1H23.

We think the shares will continue to consolidate towards the leaders in the following years. Currently, the top two players, On Semi and Willsemi, took c.60% market share in 2022.

Figure 15: On Semi and Willsemi took ~60% market share (2022)



Source Yole, company data and CMBIGM estimates

Figure 16: Share consolidated to market leaders

Market share change%	2020	2021	2022
On Semi	-2.4%	-8.5%	13.8%
Willsemi	-2.0%	6.1%	6.0%
Others	4.3%	2.4%	-19.7%

Source: Yole, S&P Mobility, CMBIGM estimates

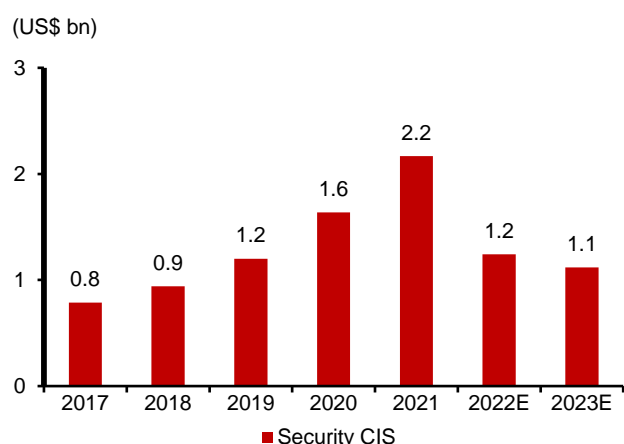
Security CIS

Security CIS market plunged by more than 40% in 2022, which we think is affected by macroeconomics and slowdown/suspension in government procurement. This is in line with our previous forecasts, however, the magnitude of impact was greater-than-expected.

The Chinese suppliers are leading in this market, benefited by the local upstream and downstream ecosystem. These manufacturers took a strong hit in 2022. Willsemi and SmartSens's sales were down 23.1%/30.3% YoY in 2022.

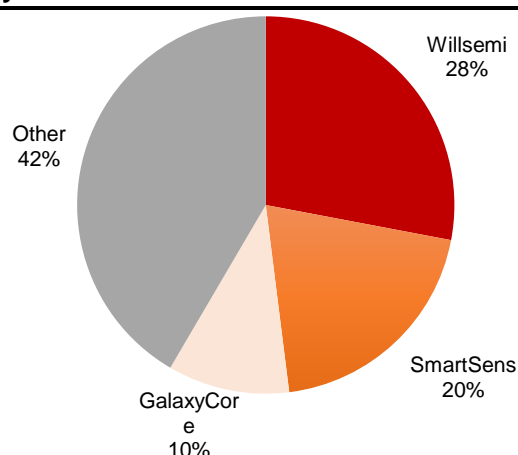
The market headwind persists into 2023, as the security CIS sales of these two companies continued to decline 24.8% and 16.4% YoY in 1H23. We are conservative in near-term market outlook. We think the demand will return once government procurement is resumed.

Figure 17: Security CIS sales plunged by 42.8% YoY to US\$1.2bn in 2022



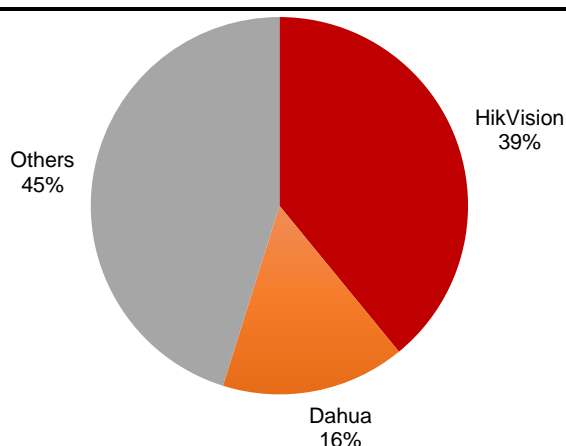
Source: Yole, CMBIGM estimates

Figure 18: Chinese CIS players are leading in the security CIS market



Source: Yole, CMBIGM estimates

Figure 19: Security camera suppliers market share in 2021



Source: Yole, CMBIGM estimates

Figure 20: Changes of competitive landscape during 2020-2022

Market share change%	2020	2021	2022
Willsemi	NA	5.3%	6.4%
SmartSens	4.7%	4.4%	2.9%
GalaxyCore	4.2%	-0.6%	3.5%
Sony	-12.6%	-9.0%	NA
Others	NA	0.0%	NA

Source: Yole, CMBIGM estimates

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Address: 45/F, Champion Tower, 3 Garden Road, Hong Kong, Tel: (852) 3900 0888 Fax: (852) 3900 0800

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