

# Regional Industry Focus

# Technology Sector

Refer to important disclosures at the end of this report

DBS Group Research . Equity

22 Jun 2021

## How long will chip shortage last?

- Chip shortage shows no signs of abating as demand remains strong
- Higher chip prices and longer waiting times while chip makers ramp up production and boost capacity
- Chip supply situation can improve in 1H22 and is likely to be resolved by 2023
- Semiconductor plays – [AEM](#), [ASM Pacific](#), [Frencken](#), [Inari](#) and [UMS](#) – are clear beneficiaries; while mid-to-downstream players' fortunes could be mixed

### Worsening chip shortage as demand outstrips supply.

The global chip shortage, which started in 2020 and first affected the automobile industry, has now extended to the entire tech industry. The COVID-19 pandemic, which has affected the supply chain, coupled with the change of lifestyle leading to increased demand for consumer electronics, contributed to the chip shortage. The situation has worsened as automobile accounts for only about 10% of the market share for chips while consumer electronics account for some 70% market share.

**Higher chip prices, longer waiting times.** Due to strong demand and tight supply, prices of chips and other related components are rising while some are even out-of-stock. Impacted manufacturers are shifting to higher-end models to maximise sales or postponing new launches. Waiting time for chips has risen to a record high, with no signs of abating.

**Major chipmakers to the rescue.** Chipmakers are ramping up output and increasing their capacity to meet the rising demand. The global semiconductor manufacturing capacity is expected to rise 5.7% y-o-y in 2021, followed by another 6.1% gain in 2022. But this may not be sufficient to meet the projected 12.5% and 4.1% growth for the semiconductor market in 2021 and 2022 respectively.

**Chip shortage could extend to 2022/2023.** Given the high utilisation rate for foundries and a seasonally stronger 2H, we maintain our view that the chip supply situation can improve in 1H22 and should normalise by 2023.

**Winners and losers.** Semi-conductor plays are the clear beneficiaries. We continue to like [AEM](#), [UMS](#), [Frencken](#), [ASM Pacific](#) and [Inari](#). However, the fortunes of mid-to-downstream players could be somewhat mixed, depending on their customer focus and market positioning. Consolidation will favour leading players such as [Xiaomi](#).

### Analyst

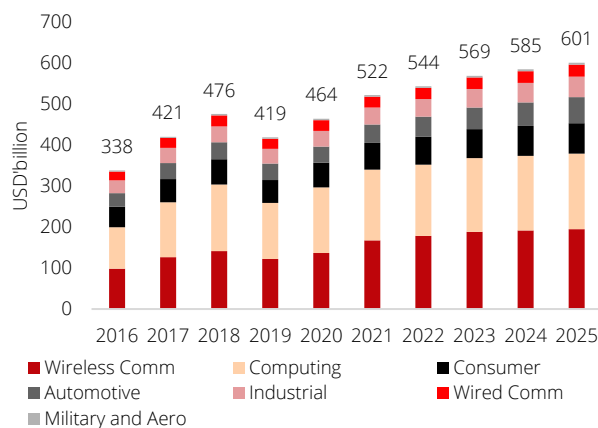
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### STOCKS

	Price LCY	Mkt Cap US\$m	12-mth Performance (%)		Rating
			Target Price LCY	3 mth 12 mth	
<a href="#">AEM Holdings Ltd</a>	3.67	764	4.73	(13.1) 8.7	BUY
<a href="#">ASM Pacific</a>	98.70	5,778	118	13.8 38.8	BUY
<a href="#">Frencken Group</a>	1.69	549	1.98	18.9 108.6	BUY
<a href="#">Inari Amertron</a>	3.20	2,602	3.85	(2.4) 90.5	BUY
<a href="#">UMS Holdings</a>	1.39	573	1.83	12.7 56.0	BUY

Source: DBS Bank, Bloomberg Finance L.P.  
 Closing price as of 21 Jun 2021

### Market size for the semiconductor industry and various sub-segments



Source: Bloomberg Finance L.P., IDC



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## How bad is the chip shortage?

**Demand outstrips supply.** Chips serve as an essential component and can be found in automobiles, servers and devices such as smartphones, PCs and other consumer electronics. Chip shortage, which started in 2020, has worsened now as demand for chip continues to outstrip supply.

**Chip shortage extended from automobile to other industries.** The global chip shortage, which first affected the automobile industry, has now extended to the whole tech industry. The automotive industry had pulled back orders last year, especially in 1H20 in the wake of the pandemic while other industries such as tablet, laptop and mobile device manufacturers were increasing orders. As automotive demand gradually picked up in 2H20, car makers made a dash for chip supplies but capacity were mostly filled by chips for other usages.

**Automotive industry was impacted the most; but supply is expected to improve.** Since the outbreak of COVID-19, Chinese automakers suspended their production in February while European and American automakers closed their operations in March 2020. During this period, many automakers took the initiative to cut chip orders. Automobile component manufacturers also received notices from automakers to cut orders and suspend shipments. In 1Q20, hundreds of auto manufacturers suspended their production due to component shortage and lack of manpower. However, the global automobile market had unexpectedly recovered during 2H20. The sales of various automobile manufacturers rebounded but the main production of upstream chip manufacturers had already shifted to other industries.

Going forward, supply is expected to improve as global semiconductor producers are shifting their capacity to produce automotive chips. TSMC has announced it will increase the production of automotive chips (microcontroller units) by 60% over 2020 to alleviate the semiconductor shortage that is affecting the global car industry. Hence, priorities given to automotive chips should help improve supply in the coming quarters.

## Reasons for the chip shortage

The chip shortage was exacerbated by the COVID-19 pandemic that has affected the global supply chain and led to a structural change in lifestyle, as well as other external factors.

**COVID-19 pandemic affected supply chain.** As COVID-19 wreaked havoc globally, demand for chips had surged and global chip manufacturers have found it challenging to keep up with the strong demand. This has put a strain on global supply chains. The situation was exacerbated by the movement restriction measures put in place. Preventive measures have been established by the authorities to curb the spread of COVID-19, such as suspending work activities and instituting quarantine practices for foreign workers. These government policies would directly affect the production of chips, coupled with a reduction of manpower. As a result, the chip supply decreased.

**Change of lifestyle leads to increased demand for consumer electronics.** Apart from supply chain issues, the work-and-study-from-home trends during the COVID-19 pandemic have also led to a surge in demand for consumer electronics such as PCs, tablets and servers in order to turn their homes into appropriate working environments. As chips are used in most electronic products, the demand for chips rose further and this led to an even greater shortage.

**External factors that lead to the decrease in chip supply.** Apart from the pandemic, there are three major issues that led to reduced chip production.

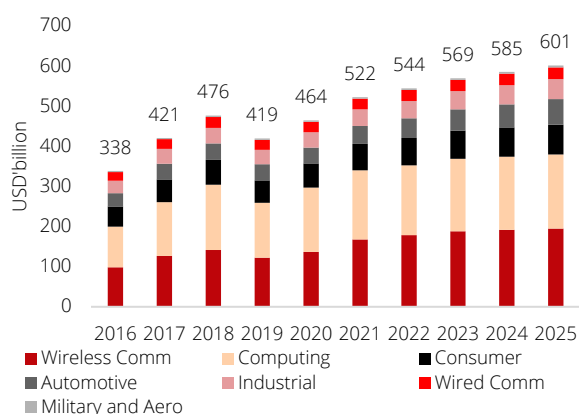
- 1) During 1Q21, there was a fierce snowstorm that destroyed the electric supply for chip factories in Texas. Large chip manufacturers such as Samsung and NXP Semiconductors have halted production at their Texas facilities. They were forced to shut down during the period.
- 2) Taiwan has been a country that suffered from outbreaks of COVID-19. Factories were forced to stop their operations to comply with the disease control measures. As the factories of several leading chip manufacturers are located in north Taiwan, the threat of a lower global chip production volume was indeed real.
- 3) The eastern part of Japan suffered a magnitude 7.3 earthquake in February 2021. Chips factories located in eastern Japan were damaged, which led to a further shortage of chips. The damage was extensive and it was difficult for these chip factories to normalise their production.

### How chip shortage has affected the supply chain

#### Automotive is just a small part of the entire chip market.

Though the automobile industry is badly affected, this only accounts for about 10% of the total chip market, according to data from IDC. Consumer electronics (PCs, smartphones and others) account for some 70% of the semiconductor market.

### Market size for the semiconductor industry and various sub-segments



Source: Bloomberg Finance L. P., IDC

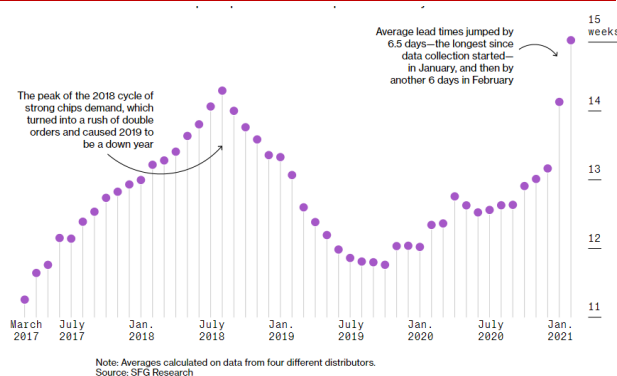
**Shifting to high-end models to maximise sales; postponing new launches.** Since the demand of chips continues to outstrip supply, prices of chips and other related components are rising or some are even out of stock. Manufacturers are facing challenges of not able to access enough chips to make their products. These impacted consumer electronics manufacturers have shifted their production to high-end models to maximise their sales. Therefore, global shipments were affected.

As one of the consumer electronics giants, **Apple** is being impacted directly on its production of MacBook and iPad. The impacted products are iPad Pro, iPad mini 5, iPad, MacBook Pro 13" and MacBook Pro 16". Apple has postponed component orders for the two devices to the second half of the year, which led to the limited growth of the shipments for these products. The supply constraints led to a revenue impact of USD\$3-4bn in 2Q21.

**Samsung**, another major smartphone manufacturer, has postponed the launch of the next Galaxy Note smartphone to 2022 due to the chip shortage. PC vendors such as **Lenovo** were running at a low level of two to three weeks' channel inventory vs. six to eight weeks' channel inventory during normal times.

**Longer waiting times for chips.** Companies that wish to order chips now face a long waiting time. The waiting time of chips in 2H19 is around 11.7 weeks, compare with that for 1H20 at 12.2 weeks, followed by 12.5 weeks for 2H20 and 17 weeks for April 2021. This shows users are facing an increasingly desperate time to secure orders, according to data compiled by the Susquehanna Financial Group. The waiting time for chip orders could get worse before it gets better.

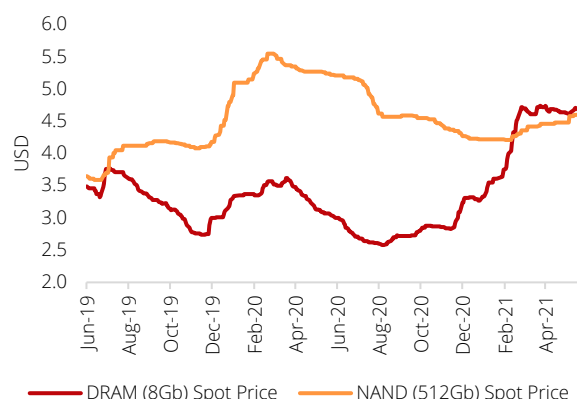
### Longer waiting times for chip



Source: Bloomberg Finance L. P., Susquehanna Financial Group

**ASP increase more prominent for DRAM.** In terms of the average selling price (ASP), DRAM saw a steeper increase of about 50% from a year ago, while prices for NAND are slowly creeping up. The ASP for other types of chips like logic and analogue chips is expected to be less volatile.

### ASP for DRAM and NAND



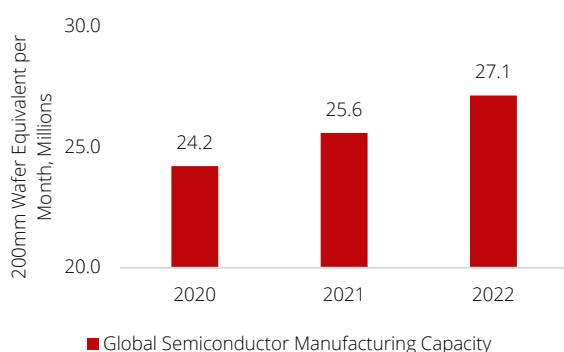
Source: Inspectrum Tech Inc, Bloomberg Finance L.P.

### How global chip makers are coping with the chip shortage

**Solutions from major chip foundry companies.** The global chip shortage has reached a serious phase. Chipmakers are ramping up their production and increasing their capacity in an attempt to meet the rising demand. The global semiconductor manufacturing capacity is expected to increase 5.7% y-o-y in 2021, followed by another 6.1% rise in 2022. But this may not be sufficient to meet the projected 12.5% and 4.1% growth for the semiconductor market in 2021 and 2022 respectively, based on data from IDC. (See chart on page 3 – Market size for the semiconductor industry and various sub-segments)

In the longer term, adding capacity to the industry rather than the reallocation of resources seems to be a more sustainable solution. However, the building of new fabs could take up to three years or even longer sometimes. Even for those with existing facilities, securing equipment has also been a challenge given that equipment makers are also lacking the chips they need to make the tools. It could take a few years for the ecosystem to address the shortage of foundry capacity. For now, some major chip foundry companies have taken various approaches to expand their chip capacity. (Refer to the table below)

### Global Semiconductor Manufacturing Capacity



Source: Bloomberg Finance L.P., IDC

Source: IDC, Bloomberg Finance L.P., DBS Bank

### Plans put in place by some major chip manufacturers

Chip manufacturer	Actions taken towards capacity expansion
Intel Corporation	<ul style="list-style-type: none"> <li>- Announced a US\$20bn plan in March to expand its advanced chip manufacturing capacity, building two factories in Arizona and opening its plants to outside customers</li> </ul>
Taiwan Semiconductor Manufacturing Company, Limited (TSMC)	<ul style="list-style-type: none"> <li>- Priority given to the supply of automotive chips</li> <li>- Expansion of its capacity at multiple sites with acquired land and equipment</li> <li>- Further expansion of capacity in Nanjing and expects to invest about US\$100bn over the next 3 years</li> <li>- Building an advanced semiconductor factory in Arizona, with construction planned in 2021 and production targeted to begin in 2024</li> </ul>
United Microelectronics Corporation (UMC)	<ul style="list-style-type: none"> <li>- Prioritise the supply of automotive chips</li> <li>- Aims to meet the target of 50,000 to 60,000 wafer production per month in 2021 with an additional 20,000 from 2022 onward</li> <li>- Percentage of capacity is growing by 4%, with 1% on the 8-inch wafer and 5% on the 12-inch wafer</li> </ul>
Samsung Electronics	<ul style="list-style-type: none"> <li>- US\$17bn to expand foundry capacity in its facility in Texas</li> </ul>
Semiconductor Manufacturing International Corporation (SMIC)	<ul style="list-style-type: none"> <li>- Increase the monthly capacity of 45,000 for 8-inch and 10,000 for the 12-inch wafer</li> <li>- Signed a cooperation framework agreement for the Shenzhen project in March with a goal of building a capacity of 40,000 12-inch wafers per month for non-FinFET technology</li> </ul>
Tower semiconductor Ltd	<ul style="list-style-type: none"> <li>- Capacity expansion plan for our 8-inch and 12-inch fabs and issued US\$150m purchase orders for manufacturing equipment and facilities</li> </ul>
Hua Hong Semiconductor Ltd	<ul style="list-style-type: none"> <li>- Moving most of the equipment in the second half of 2021, and expects to have about 65,000 capacity by the end of 2021</li> <li>- Expects to reach 80,000-plus wafers per month by mid-2022</li> </ul>

Source: various company website; DBS Bank

### When will the shortage end?

The shortage could extend to 2022/2023. Given the high utilisation rate for foundries and a seasonally stronger 2H, we maintain our view that the chip supply situation can only improve in 1H22 and is likely to normalise only by 2023. The ramp-up of production capacity by the different foundries/Integrated Device Manufacturers in the wake of chip shortages are only expected to come online by 2022/2023. Factoring in the 4-6 months' lead time and the current situation, we maintain our view that the chip supply situation will improve in 1H22 and should normalise by 2023 at the latest.

### Winners and losers – impact on tech stocks under our coverage

Semi-conductor plays are the clear beneficiaries. We continue to like **AEM, ASM Pacific, Frencken, Inari** and **UMS**. The fortunes of mid-to-downstream players could be mixed, depending on their customer focus and market positioning. Consolidation will favour leading players such as **Xiaomi**.

**Winners and losers – impact of chip shortage on technology and automotive stocks under our coverage**

Legend:	Winner	Neutral	Loser
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Company	Products	Remark
<b>Hong Kong</b>		
AAC Technology	Smartphone components including acoustic, microphone and handset lens sets	AAC is exposed to global smartphone makers, such as Apple, Samsung and Chinese handset makers. Its products are applied to low-to-high-end smartphones. In general, its end customers are having stronger bargaining power over chip resource allocation. The negative impact is manageable. The market focuses on the market share gain of its new handset lens sets products.
ASM Pacific	Back-end semiconductor production equipment and surface mount technology solutions	As a semiconductor production equipment provider, the company benefits from the expansion of semiconductor capacity to cope with the chip shortage. It is experiencing a surge in customer demand. 1Q21 revenue and booking increased by 46% and 73% y-o-y partly driven by the semiconductor solution business. Gross profit margin improved by 2.7ppts to 39.6% thanks to higher capacity utilization and increased productivity.
Q Technology	Handset camera module and fingerprint recognition modules	Q Technology is mostly exposed to leading Chinese handset makers, such as Xiaomi, Oppo and Vivo. They supply more products to mid-range to low-end smartphones. Its handset camera modules and fingerprint recognition module shipments in Jan-May 2021 increased by 25% and 36% y-o-y respectively, partly due to a low base in 2020. We understand that its shipment has been negatively affected by the chip supply shortage of its end customers. The overall volume increase is due to market share gain and increases product penetration.
Sunny Optical	Handset lens sets and handset camera modules	Sunny optical is mostly exposed to leading Chinese handset makers, such as Xiaomi, Oppo and Vivo. They supply more products to mid-range to low-end smartphones. It reported stable handset lens sets shipment YTD – 16% growth for handset camera module shipment as well as 150%+ growth for vehicle lens sets shipment YTD. We understand that the shipment has been negatively affected by the chip supply shortage of its end customers. The overall volume increase is due to market share gain and increases product penetration.
Xiaomi	Smartphones, smart home and IoT products	Xiaomi delivered strong smartphone shipment growth of 69% y-o-y in 1Q21 as it is gaining market share from Huawei. Due to supply shortages, overall industry smartphone shipment is constrained, which led to improvements in its product mix and fewer discount activities. As a result, its smartphone gross margin rose by 4.8ppts to 12.9%. The inventory of the company remains at a healthy level to support strong shipment growth in 2021.

Source: DBS HK

Company	Products	Remark
<b>Automotive</b>		
BYD	Automobile manufacturer and related critical parts and components such as engines, EV battery and automotive chips	The company has in-house production of microcontroller chip production, thus reducing the impact of chip shortage on its business. For 5M21, the company chalked up total vehicle volume sales growth of 57% y-o-y, better than the industry average passenger vehicle sales performance of 38% (+4% vs. 5M19). Under the long-term NEV development plans, the Chinese government intends to broaden the semiconductor industry's development, and this should be positive for BYD's semiconductor operations.
BAIC Dongfeng Motor Geely Great Wall Motor Guangzhou Auto	Automobile manufacturers and related auto parts such as engines	As these companies generally source their automotive chips from third-party suppliers, the recent automotive chip shortage has impacted their operations. To mitigate the chip shortage, automobile companies are sourcing from some smaller domestic producers and aligning their productions to high-margin products. Compared to 5M19, total vehicle volume sales growth ranged between -6% and 20% y-o-y.  Global chipmakers giving priority to automotive chips should help to alleviate the supply shortage. Besides, under the long-term NEV development plans, the Chinese government intends to broaden the semiconductor industry's development – thus implying that Chinese automakers can invest in the automotive chips business in the future.
<b>Singapore</b>		
AEM	Back-end testing of semiconductor manufacturing process	AEM provides customised test handlers for burn-in tests, functional tests, and system-level tests for its key customer, a global chipmaker. Hence, AEM is a beneficiary of the global chip shortage. The ramp-up of its next generation tools to its key customer provides a further catalyst for the group.
Aztech	IoT devices, data-communication products, LED lighting products	Minimal impact from chip shortage as Aztech is able to leverage on its strong customer-supplier relationship to secure components and raw materials. Aztech also adopts product redesign and innovation to reduce or substitute components that are hard to secure.
Frencken	Diversified product range, including consumer electronics and medical devices; 36% exposure to semiconductor and c.12% to automotive	The current chip shortage is driving demand for both front-end and back-end semiconductor equipment. This should benefit the semiconductor business segment, where its exposure has increased to 36% in terms of revenue as at 1Q21. The group has started to see some level of delays in orders from selected customers in the automotive segment as a result of the chip shortage.
Fu Yu	Consumer electronics, medical, printing & network, automotive & power tools	Fu Yu is less affected, as it specialises in the manufacturing and sub-assembly of precision plastic parts and components, and has a diversified product range.

Source: DBS Bank, DBS HK

Company	Products	Remark
Nanofilm	Provides surface solutions using proprietary technologies	Could see some deferment of selected projects from initial production in the computer/ tablets and wearables/ accessories product category, especially for those new product launches that were released recently, and ramping up production is in the process.
UMS	Front-end semiconductor equipment and components manufacturing	Supplying semiconductor equipment and components to Applied Materials (AMAT), UMS is in a sweet spot to ride on the strong global chip demand. 1Q21 revenue and net earnings were at a record high, with stable margins.
Valuetronics	Consumer electronics, printers, sensing devices, parts for automotive	Overall impacted by chip shortage. Valuetronics is prioritising customers with clear delivery commitments and may procure certain components that are available on the spot market, but these will come at a premium. Hence, margins could be affected. We are projecting a lower net margin of 7.7% for FY Mar 22F, vs. 8.2% for FY21.
Venture	Diversified product range	Selected existing products and new product initiatives (NPIs) were affected. Its 1Q21 results were below expectations, despite the strong order momentum.
<b>Thailand</b>		
Delta Electronics	Power supplies for IT, Telecom, Industrial, Server, Networking, solar power, EV power, etc.	<p>DELTA's sales hit a record high of US\$625m in 1Q21, up 55% y-o-y and 6% q-o-q. Growth came mainly from strong demand for its Industrial Tools, Cloud Storage, Data Centre and Networking power supplies along with Electric Vehicle Solutions. Gross margin narrowed due to the change in product mix and higher logistic costs due to the COVID-19 pandemic.</p> <p>DELTA has seen a tight supply of IC and some other raw materials, but this is still manageable. Being part of Delta Electronics group, the world's leading power management solution group, the group enjoys better purchasing power as compared to its smaller peers. DELTA has also developed a diversified supplier base and country of origin of raw materials during the past years to ensure minimum disruption to its operations.</p>
Hana Microelectronics	<p>IC assembly &amp; test, PCB assembly &amp; test, opto electronics.</p> <p>Products include adapters for fast mobile charging, mobile sensors, standard ICs for 5G, LED lighting for auto, heart rate monitor sensors, RFID inlay tags, etc.</p>	<p>HANA saw higher revenue in all three businesses in 1Q21, with particularly strong growth at its IC assembly business (+18% y-o-y in baht terms), and the microdisplay/Rfid business (+27% y-o-y in baht terms). HANA still sees robust demand from the automotive, cloud computing, 5G, industrial, and consumer sectors. Overall IC demand remains very strong and the additional equipment should help increase its output in 2H21 and 2022.</p> <p>HANA has so far not been materially impacted by the shortage of the raw materials. But management admitted that this may change in the future as the lead time for raw materials (chips, lead frame, etc.) has stretched out and most companies have overbooked to build up their inventory. Nonetheless, management is monitoring the situation closely to ensure that the impact is minimal.</p>

Source: DBS Bank, DBSVT



Company	Products	Remark
K.C.E. Electronics	Printed circuit boards for automotive and consumer industries.	<p>KCE's 1Q21 net profit increased 18% y-o-y to Bt503m. This was on the back of (i) the 8% increase in sales in US dollar terms to US\$113m, and (ii) the wider gross profit margin due to the change in product mix and continued improvement in operating efficiency. Orders remained robust and KCE is expanding capacities to meet such robust demand.</p> <p>KCE has been successful in negotiations with over 90% of its customers to raise prices by 5% effective May 2021. This is to reflect the strong jump in raw material prices, particularly copper prices. We see this as a very positive development that should help boost gross profit margin sharply from 2Q21 onwards.</p>
SVI	EMS company. Products include surveillance cameras, electronics shelf labels, high-performance hard drives, optical electronics for 5G equipment	<p>Despite strong demand from customers, SVI saw its 1Q21 sales drop 6% q-o-q. This was mainly due to raw material shortages throughout the industry.</p> <p>The company has cut its top-line target from US\$600m to US\$550m this year to reflect the raw material shortage situation. This, however, still represents decent growth of 12% from US\$489m sales recorded in 2020.</p>
<b>Malaysia</b>		
Globetronics Technology	Sensor component for smart devices, LED, and quartz crystal timing devices	The key customer for the sensor division is Austria-based ams AG, who in turn supply light sensors and gesture sensors for Apple products. Minimal impact from shortages as raw material supply is relatively secured. On the other hand, the growth of its LED segment might be affected given the inability of a key customer (i.e. Soraalaser) to procure a consistent supply of raw wafer.
Inari Amertron	Back-end assembly services for RF (radio frequency) chips and optoelectronics	The sole customer for Inari's RF segment is Broadcom, a key supplier of RF chips to premium smartphone makers such as Apple and Samsung. Given strong bargaining power of its customers, supply of wafer has not been an issue. In fact, Inari has been running on high utilisation to build up sufficient inventory, especially for the newer 5G RF chips. On the other hand, its optoelectronics segment, which is generally exposed to the automotive market, is still recovering slowly amid the current chip shortage situation.
Malaysian Pacific Industries	Outsourced assembly and test services	MPI's profitability has generally been boosted by a higher utilisation rate and improved pricing power, amid capacity tightness in the sector. Despite automotive being one of its key segments (30-35% of sales), sales have not been impacted much as its customers for the segment are focused more on EVs (electric vehicles).
Unisem	Outsourced assembly and test services	Unisem's profitability has generally been boosted by a higher utilisation rate and improved pricing power, amid capacity tightness in the sector. Both its plants in Chengdu, China and Ipoh, Malaysia are operating at more than 80-85% utilisation rate. Some of its customers are indeed facing wafer shortage issues, but it does not impact Unisem much given its diversified customer base.

Source: DBSVT, AllianceDBS

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**STRONG BUY** (>20% total return over the next 3 months, with identifiable share price catalysts within this time frame)

**BUY** (>15% total return over the next 12 months for small caps, >10% for large caps)

**HOLD** (-10% to +15% total return over the next 12 months for small caps, -10% to +10% for large caps)

**FULLY VALUED** (negative total return, i.e., > -10% over the next 12 months)

**SELL** (negative total return of > -20% over the next 3 months, with identifiable share price catalysts within this time frame)

\*Share price appreciation + dividends

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Sources for all charts and tables are DBS Bank, DBS HK, DBSV TH, AllianceDBS unless otherwise specified.

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