

# Semiconductor WEEK:

April 22, 2022

*An overview of results and conclusions from recent reports at TechInsights*

## Chip Market Research Services

*Spring orders are flitting like butterflies but 2H22 is becoming blurry*

- Order activity for semiconductor equipment fell slightly, drifting at 112 degrees
- IC Inventory Levels

## Semiconductor Analytics

*Last Week in the Semiconductor Market:*

Semiconductor sales jumped >15% W/Y last week. Sales are closing in on 2021 levels. The IC weather cooled 1°F last week. Zooming in on Logic growth this week, 13-wk MA growth has dipped below 2021 levels. Growth is forecast to finish 2022 around +15% Y/Y, reaching \$294B. April forecast revisions were minimal.

TechInsights' IC Supply/Demand indices held in Tight. Chip demand is cooling as inflation, COVID lockdowns in China, and Russia's war work to accelerate the shortage's steady easing. China's GDP growth was down by 74% in 1Q22 Y/Y. Reduced electric auto production in China is helping ease shortages of Auto ICs, though they remain in shortage as demand is high despite inflation.

Inflation is affecting Electronics' Retail Prices.

## Chip History Center

**People:** Sunlin Chou on Intel's R&D Pipeline. The history of semiconductor research at Intel is discussed in this 2004 conversation.

**Power, Performance, Cost, and Moore's Law** - How Power, Performance, and Cost relate to Moore's Law are discussed in this 2004 conversation with **Sunlin Chou**, who was then Senior VP and GM, Technology & Manufacturing Group at Intel.

## The Chip Insider

**Strategy and Tactics:** SEMI ISS, Anne Kelleher, Moore's Law.

## **Semiconductor Stocks**

- *TechInsights' Semiconductor Stock Indices ended the week mixed*
- *Semiconductor Stock Index slipped*
  - *IBM was this week's biggest winner*
- *Semiconductor Equipment Stock Index was led up by ASM International*
- *EDA Stock Index sunk further*
- *Electronics Materials Stock Index was led up by Tokyo Ohka*
- *Hottest Stocks: IBM, ASM International, Western Digital, Nikon, Infineon, and Onto Innovation*

**TechInsights**

# The Chip Insider<sup>®</sup>'s Graphics File



## April 2022

### Spring orders are flitting like butterflies but 2H22 is becoming blurry

- Order activity for semiconductor equipment fell slightly, drifting at 112 degrees
- Despite the recent pullback, order activity remains at elevated levels and is pointing to another strong year for the equipment market in 2022
- TechInsights' Chip Price Performance Index fell at a faster clip



***This issue contains the latest forecast.***

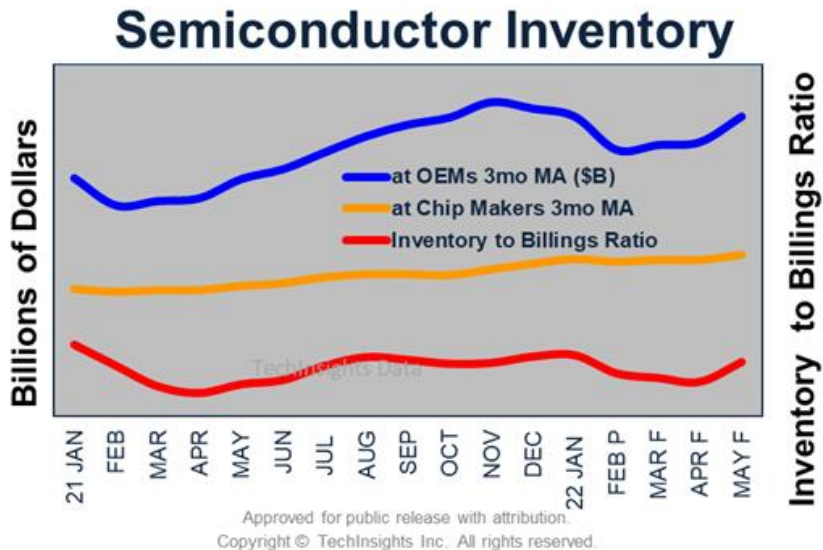
Forecast as of April 2022:	2021	2022
<b>Semi Equipment (\$B):</b>	<b>\$ 126.6</b>	<b>\$ 152.4</b>
Sequential Change	36.6%	20.3%
<b>Capacity Utilization:</b>	97.2%	96.9%
<b>ICs (\$B):</b>	<b>\$ 492.3</b>	<b>\$ 570.5</b>
Sequential Change	27.4%	15.9%
<b>IC Units (BU):</b>	394.2	439.0
Sequential Change	23.7%	11.4%
<b>Electronics (\$B) :</b>	<b>\$ 2,574</b>	<b>\$ 2,758</b>
Sequential Change	18.9%	7.1%

# The Chip Insider<sup>®</sup> Graphics

## IC Inventory Levels:

- Inventories are rising

**IC Inventory Levels:** chart gives rolling averages for semiconductor integrated circuit inventories held at OEMs, in Die Banks, and the total Inventory-to-Billing Ratio



## Insights Interview:

# Workforce Development Solutions...

with Ajit Manocha of SEMI



## What the conversation is about:

- Labor shortages have become the echo pandemic from the ravages COVID has had on the economy.
- This is no truer than in the semiconductor industry, where Workforce Development has long been on the To-Do lists of many.
- Most industry efforts appear to be more about lobbying others to do something about workforce development.
- It's really hard to do something substantive about it but SEMI is.

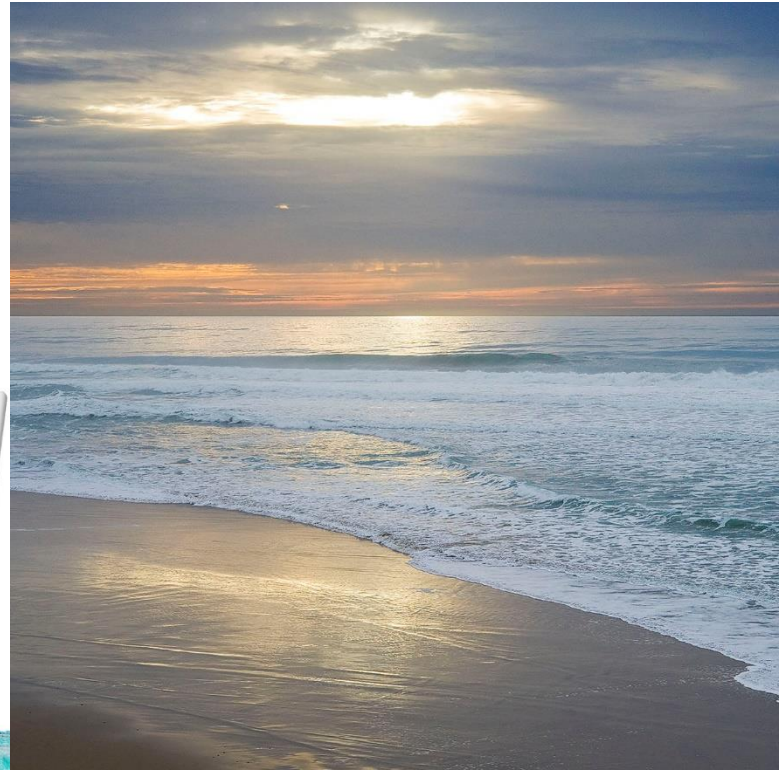
[Click here to watch online](#)

# Semiconductor Analytics

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1: Measures Order Activity 2: Measures Pricing Power

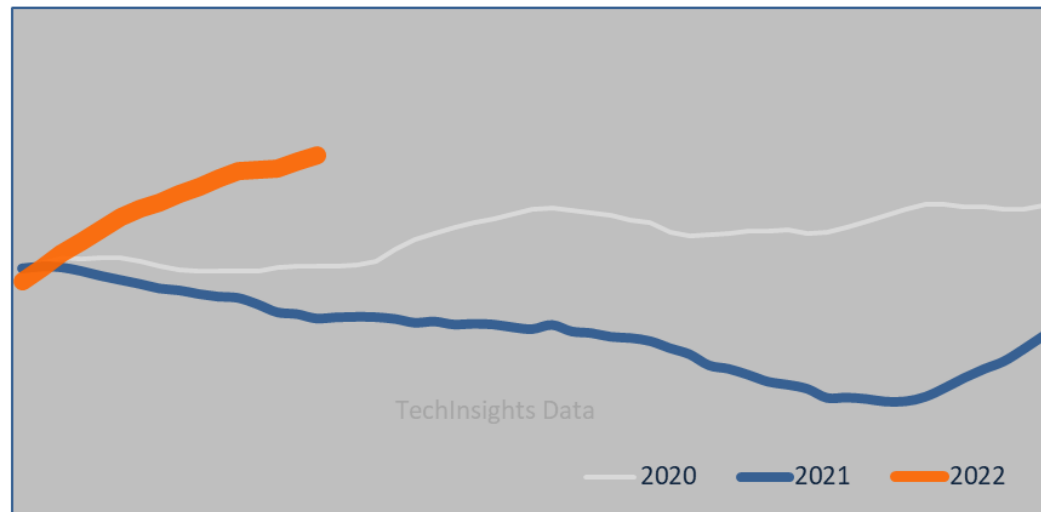
# Electronics Retail Pricing Trends:

for PC notebooks Tablets Smartphones Cell phones Digital Cameras Appliances TVs

Inflation is affecting  
Electronics' Retail  
Prices

### Electronics Pricing Barometer

indexed 13 week moving average



Source: Semiconductor Analytics

Quarter.Week

Chart approved for public release with attribution.  
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## Insights Interview:

### Innovation in Memory ...

with Scott DeBoer of Micron  
Technology



### What the conversation is about:

- Scott DeBoer of Micron Technology has a conversation with Dan Hutcheson about what it takes to innovate in Memory today. Scott leads Micron's global technology development and engineering efforts – from silicon design to high-value system solutions.

[Click here to watch online](#)



**Strategy and Tactics:** SEMI ISS, Anne Kelleher, Moore's Law.

### Summaries:

**SEMI ISS:** *I have to say that 2022's conference was the best ever and I wasn't the only one who felt that way. It had record attendance and attendees were not disappointed. Maybe it was just the family-reunion-like euphoria from having travel and face-to-face meetings locked down for two years. Everyone thought video meetings were OK. Some even thought they were equivalent to in-person ... at least at the beginning of the lockdown. But think of it this way: a 4K video monitor is 2D, with a bandwidth limited color space, and only 8.29-kilopixels. With in-person meetings the resolution is limited by lighting and human eyes, which present a 3-D image with 10M colors and have a resolution of 576 megapixels. Compared to a video conference, SEMI ISS 2022 was like the difference between sparkling apple juice and a bottle of Veuve Clicquot champagne. No wonder it was euphoric!*

*But it was far more than resolution. A picture can only tell a 1000 words if the content is great, as this conference has shown. Here's my take ... The keynote by Intel's Ann Kelleher presented the best modern perspective on Moore's Law I have ever seen, making her a real Moore's Law scholar... Few people rise to the level of scholar on*

[Contact us to get the full report and more](#)

*the subject.... The most common view of Moore's Law is that it's simply planar lithographic scaling... Given the 1965's paper's title, "Cramming more components onto integrated circuits," I don't think Moore's Law is this limited. What's so important about Anne's slide is that it pulls in two concepts from what CalTech's Carver Mead meant when he coined the term of it and what I have called a chaotic attractor for emergent behavior that drives innovation in our industry. Anne bested that in this slide's title, "We Evolve Together as an Industry" and it's subtitle, "Moore's Law is About Innovation." Anne took my Moore's Law mash and distilled into a fine Irish Whiskey in this slide's title, "We Evolve Together as an Industry" and it's subtitle, "Moore's Law is About Innovation." ... And what about STCO, or System-Technology Co-Optimization, where a single die is joined in a package with physical blocks of IP called chiplets?*

**Dan's Book Shelf:** *Resilient Grieving: How to Find Your Way Through a Devastating Loss* by Lucy Hone, Ph.D. ...

*"I've always been more interested in the future than in the past"*  
— Grace Hopper





**People:** Sunlin Chou on [Intel's R&D Pipeline](#). The history of semiconductor research at Intel is discussed in this 2004 conversation. Learn how Intel systematically turned research into gold with the approach they developed called the "pipeline." At the core of Sunlin's values is the belief that all problems should be dealt with systematically and this is exactly how he dealt with the issue of reviving Intel's prowess after the 1985 debacle ...

**[Power, Performance, Cost, and Moore's Law](#)** - How Power, Performance, and Cost relate to Moore's Law are discussed in this 2004 conversation with Sunlin Chou, who was then Senior VP and GM, Technology & Manufacturing Group at Intel. Sunlin discusses how managing these parameters has evolved over time. As semiconductor chips get larger with more transistors it would seem that they would consume more power. Learn why this is not the case here. Topics covered include: How leakage currents can rise faster than drive currents as transistors get smaller. Where the power is being consumed in system. The new issues that were emerging as semiconductors crossed the 100nm barrier.

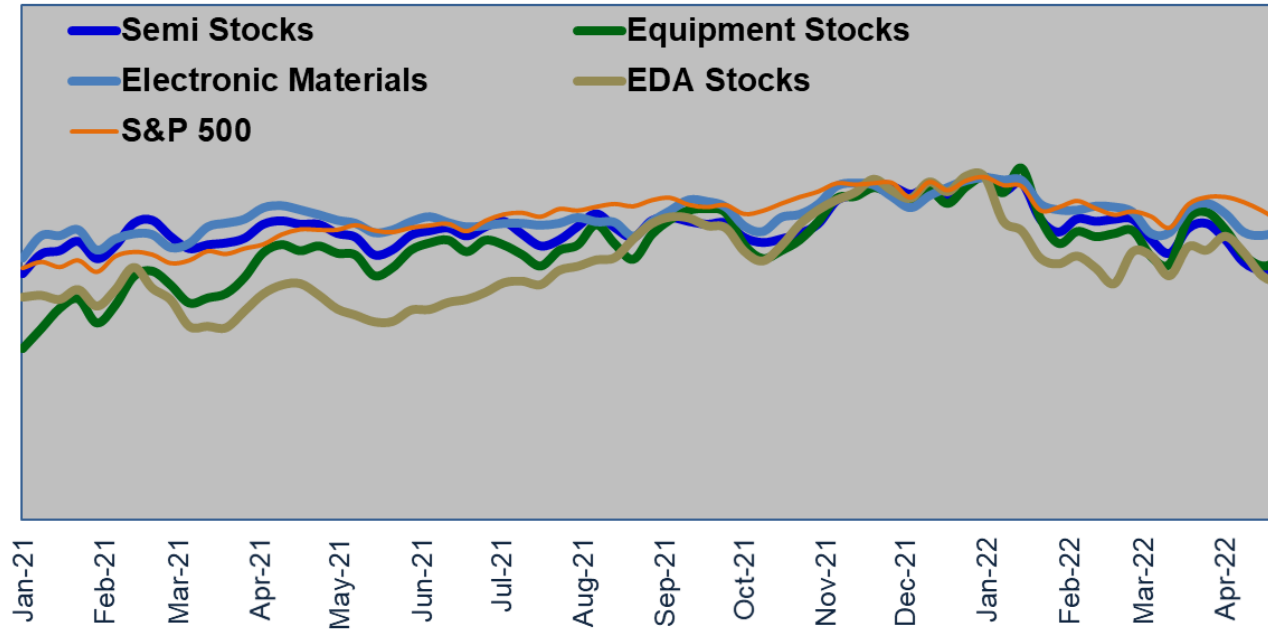
# semiStockWEEK:

TechInsights' Semiconductor Stock Indices ended the week mixed, Semiconductor stock index slipped to a new yearly low while the S&P 500 sunk for the third consecutive week.



## Semiconductor Industry Stock Performance Indices

(Stock Prices Indexed to 100 in last week of 2021)



### TechInsights' Stock Indices:

Semiconductors -0.3%  
Equipment +1.6%  
Electronic Materials +1.3%  
EDA -2.2%

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# Semiconductor Stocks:

## Weekly Growth and Forward P/E Ratios by Company

Weekly Gains			4/22/2022		
Semiconductor Stocks	Price Change	Forward P/E	Semiconductor Stocks	Price Change	Forward P/E
<b>IDM</b>			<b>Fab-lite to Fabless</b>		
Intel	1.9%	12	AMD	-5.3%	20
Micron	-1.0%	6	Analog Devices	-0.8%	17
ON Semiconductor	-2.8%	12	Broadcom	2.3%	15
Samsung Electronics	0.6%	-	IBM	9.3%	12
SK hynix	2.3%		Infineon	4.9%	13
STMicroelectronics	2.5%	11	MagnaChip Semiconductor	0.8%	10
Western Digital	6.7%	5	MaxLinear	-2.2%	11
<b>Foundry &amp; OSAT</b>			MediaTek	2.6%	-
Amkor	2.3%	7	NVIDIA	-8.2%	31
ASE	-0.9%	9	Panasonic	0.1%	10
GLOBALFOUNDRIES	-2.6%	19	Qualcomm	-3.0%	11
JCET	-4.2%	13	Silicon Laboratories	-4.2%	39
SkyWater Technology	-18.8%	-	Skyworks	-2.2%	9
SMIC	-4.2%	11	Texas Instruments	-0.2%	19
TSMC	-2.6%	16			
UMC	-2.2%	8			

Above Avg

Top 4-6

Top 1-3

**TechInsights' Semiconductor Stock Index** slipped this week despite claiming three of the top six stock spots. IBM was this week's biggest winner buoyed by its better than expected earnings for the first quarter. Western Digital and Infineon also had a strong week.

IDM +1.5%  
 Foundry & OSAT -4.1%  
 Fabless & Fablite -0.4%

AMD <sup>AMD</sup> Analog Devices <sup>ADI</sup> Amkor <sup>AMKR</sup> ASE <sup>ASX</sup> Broadcom <sup>AVGO</sup> GLOBALFOUNDRIES <sup>GFS</sup> IBM <sup>IBM</sup> Infineon <sup>IFNNY.PK</sup> Intel <sup>INTC</sup> JCET <sup>600584.SS</sup> Micron Technology <sup>MU</sup> On Semiconductor <sup>ON</sup> Panasonic <sup>PC</sup> MagnaChip Semiconductor <sup>MX</sup> MaxLinear <sup>MXL</sup> MediaTek <sup>2454.TW</sup> NVIDIA <sup>NVDA</sup> Qualcomm <sup>QCOM</sup> Samsung Electronics <sup>005930.KS</sup> Silicon Laboratories <sup>SLAB</sup> SkyWater Technology <sup>SKYT</sup> Skyworks <sup>SWKS</sup> SMIC <sup>SMI</sup> STMicroelectronics <sup>STM</sup> Texas Instruments <sup>TXN</sup> TSMC <sup>TSM</sup> UMC <sup>STMicroelectronics</sup> Western Digital <sup>WDC</sup>

# Chip Equipment & Related Stocks:

## Weekly Growth and Forward P/E Ratios by Company

Weekly Gains			4/22/2022		
Equipment Stocks	Price Change	Forward P/E	Equipment Stocks	Price Change	Forward P/E
<b>Wafer Fab:</b>			<b>Test:</b>		
Applied Materials	-0.5%	12	Advantest	2.4%	–
ASM International	6.8%	23	Teradyne	3.0%	16
ASML	1.6%	28	FormFactor	1.4%	18
KLA	0.9%	14			
Lam Research	1.5%	12	<b>Assembly:</b>		
Onto Innovation	4.6%	–	BESI	3.5%	–
Nikon	5.3%	–	Kulicke & Soffa	-6.2%	9
TEL	3.0%	–	ASM Pacific Technology	-1.5%	
Veeco Instruments	-1.5%	12			

Above Avg

Top 4-6

Top 1-3

**TechInsights' Semiconductor Equipment Stock Index** was led up by ASM International, followed by Nikon and Onto Innovation. ASM International reported record earnings for the first quarter and doesn't anticipate demand slowing as chip makers continue to increase capacity.

WFE +2.4%  
 Test +2.3%  
 Assembly -1.4%

Applied Materials <sup>AMAT</sup> Advantest <sup>ATEYY</sup>  
 ASM International <sup>ASMIY</sup>  
 ASM Lithography <sup>ASML</sup> ASM Pacific <sup>0522.HK</sup>  
 BE Semiconductor <sup>BESIIY.PK</sup>  
 FormFactor <sup>FORM</sup> KLA <sup>KLAC</sup>  
 Kulicke & Soffa <sup>KLIC</sup> Lam Research <sup>LRCX</sup>  
 Onto Innovation <sup>ONTO</sup> Nikon <sup>7731</sup>  
 Teradyne <sup>TER</sup> Tokyo Electron Limited <sup>8035</sup>  
 Veeco <sup>VECO</sup>

# Electronic Materials Stocks:

## Weekly Growth and Forward P/E Ratios by Company

Weekly Gains			4/22/2022		
EDA & Electronic Materials Stocks	Price Change	Forward P/E	EDA & Electronic Materials Stocks	Price Change	Forward P/E
<b>EDA</b>			DNP	0.1%	–
Cadence	-1.2%	35	DuPont de Nemours	-2.1%	5
Synopsys	-3.3%	32	JSR	3.0%	–
Ansys	-2.1%	32	Shin-Etsu	1.6%	–
<b>Electronic Materials</b>			SOITEC	1.0%	–
BASF	1.2%	2	Tokyo Ohka	3.2%	–
CMC Materials	2.0%	21			

Above Avg
Top 4-6
Top 1-3

TechInsights' EDA Stock Index sunk further this week.

TechInsights' Electronic Materials Stock Index was led up by Tokyo Ohka.

Ansys, Inc. <sup>ANSS</sup>    BASF <sup>BASFY</sup>  
 CMC Materials <sup>CCMP</sup>    Cadence <sup>CDNS</sup>  
 DNP <sup>7912</sup>    DuPont <sup>DD</sup>    JSR <sup>4185</sup>  
 Shin-Etsu <sup>4063</sup>    SOITEC <sup>SOI.PA</sup>  
 Synopsys <sup>SNPS</sup>    Tokyo Ohka <sup>4186</sup>

The Prior Week's Close	TechInsights' Indices of Chip Industry Stocks				Weekly Growth				Companies Up	Max Growth	Companies Down	Min Growth	Range of Growth	S&P 500	S&P 500 Growth
	Semi Stocks	Equipment Stocks	Materials Stocks	EDA Stocks	Semi Stocks	Equipment Stocks	Materials Stocks	EDA Stocks							
17-Sep-21	88.9	92.6	94.3	88.6	-0.8%	0.4%	-0.4%	-2.0%	23	5.5%	-30	-6.8%	12.3%	93.0	-0.6%
24-Sep-21	89.2	91.7	93.1	88.1	0.3%	-1.0%	-1.3%	-0.5%	22	5.8%	-30	-5.2%	11.0%	93.5	0.5%
01-Oct-21	85.8	84.2	88.6	82.6	-3.8%	-8.2%	-4.8%	-6.2%	6	4.3%	-48	-14.7%	19.0%	91.4	-2.2%
08-Oct-21	84.7	81.0	87.3	80.3	-1.4%	-3.8%	-1.5%	-2.8%	15	2.9%	-39	-14.3%	17.2%	92.1	0.8%
15-Oct-21	85.5	82.8	90.6	83.9	1.0%	2.2%	3.8%	4.4%	39	8.1%	-14	-11.8%	19.9%	93.8	1.8%
22-Oct-21	86.8	85.3	91.3	88.9	1.5%	3.0%	0.8%	5.9%	40	15.7%	-14	-11.6%	27.3%	95.4	1.6%
29-Oct-21	89.0	89.6	93.7	92.2	2.6%	5.0%	2.6%	3.8%	38	24.6%	-16	-8.3%	32.9%	96.6	1.3%
05-Nov-21	94.4	95.0	98.0	94.6	6.1%	6.1%	4.6%	2.5%	45	30.5%	-8	-29.8%	60.3%	98.6	2.0%
12-Nov-21	95.9	95.5	98.7	96.4	1.5%	0.4%	0.7%	1.9%	31	8.5%	-16	-12.1%	20.6%	98.3	-0.3%
19-Nov-21	98.3	97.5	98.2	99.4	2.6%	2.1%	-0.4%	3.2%	39	12.2%	-16	-16.8%	29.0%	98.6	0.3%
26-Nov-21	97.7	96.0	95.5	96.8	-0.6%	-1.6%	-2.8%	-2.7%	16	11.8%	-39	-9.6%	21.4%	98.6	0.1%
03-Dec-21	95.9	94.5	92.9	95.0	-1.9%	-1.6%	-2.7%	-1.9%	12	6.0%	-44	-11.1%	17.1%	95.2	-3.5%
10-Dec-21	97.5	96.9	95.7	98.8	1.6%	2.6%	3.0%	4.0%	40	13.2%	-15	-7.5%	20.7%	98.9	3.8%
17-Dec-21	94.7	93.8	97.7	96.5	-2.9%	-3.2%	2.1%	-2.3%	12	25.6%	-43	-15.6%	41.2%	96.9	-1.9%
24-Dec-21	98.6	97.7	99.3	100.2	4.1%	4.2%	1.7%	3.8%	50	13.8%	-6	-2.8%	16.6%	99.2	2.3%
31-Dec-21	100.0	100.0	100.0	100.0	1.5%	2.3%	0.7%	-0.2%	44	8.1%	-11	-2.7%	10.8%	100.0	0.9%
07-Jan-22	96.6	96.3	99.4	89.7	-3.4%	-3.7%	-0.6%	-10.3%	10	7.4%	-45	-17.5%	24.9%	98.1	-1.9%
14-Jan-22	98.5	102.0	99.3	87.4	2.0%	5.9%	-0.1%	-2.5%	36	23.7%	-20	-4.9%	28.6%	97.8	-0.3%
21-Jan-22	90.1	90.4	93.8	81.0	-8.5%	-11.4%	-5.6%	-7.3%	3	5.1%	-53	-20.3%	25.4%	92.3	-5.7%
28-Jan-22	87.1	84.5	92.4	79.7	-3.4%	-6.6%	-1.5%	-1.7%	11	5.0%	-45	-21.8%	26.8%	93.0	0.8%
04-Feb-22	90.2	87.3	92.3	81.5	3.5%	3.3%	-0.1%	2.3%	41	17.5%	-13	-4.3%	21.8%	94.4	1.6%
11-Feb-22	89.6	86.1	93.2	78.7	-0.7%	-1.4%	1.0%	-3.4%	20	10.6%	-33	-8.9%	19.5%	92.7	-1.8%
18-Feb-22	90.1	86.8	93.0	75.0	0.6%	0.8%	-0.2%	-4.7%	28	12.2%	-26	-7.0%	19.2%	91.2	-1.6%
25-Feb-22	90.1	87.5	91.9	82.5	0.0%	0.8%	-1.3%	9.9%	30	14.7%	-25	-9.5%	24.2%	92.0	0.8%
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18-Mar-22	87.9	90.3	92.7	83.7	7.1%	13.3%	6.5%	8.8%	53	31.3%	-2	-5.9%	37.2%	93.6	6.2%
25-Mar-22	89.1	91.8	94.0	82.9	1.3%	1.7%	1.3%	-0.9%	36	9.2%	-16	-5.5%	14.7%	95.3	1.8%
01-Apr-22	85.4	87.8	91.5	86.1	-4.2%	-4.3%	-2.6%	3.9%	5	5.0%	-50	-23.1%	28.1%	95.4	0.1%
08-Apr-22	80.1	81.9	87.1	82.3	-6.2%	-6.8%	-4.8%	-4.4%	2	5.5%	-53	-17.6%	23.1%	94.2	-1.3%
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22-Apr-22	77.8	80.5	87.4	75.2	-0.3%	1.6%	1.3%	-2.2%	30	9.3%	-25	-18.8%	28.1%	89.6	-2.8%

# Links to Conference Call Transcripts

April 22<sup>nd</sup>

[ASM International NV \(ASMIY\) CEO Benjamin Loh on Q1 2022 Results - Earnings Call Transcript](#)

[Lam Research Corporation \(LRCX\) CEO Tim Archer on Q3 2022 Results - Earnings Call Transcript](#)

[ASML Holding N.V.'s \(ASML\) CEO Peter Wennink on Q1 2022 Results - Earnings Call Transcript](#)

[International Business Machines Corporation's \(IBM\) CEO Arvind Krishna on Q1 2022 Results - Earnings Call Transcript](#)

April 15<sup>th</sup> and before

[Taiwan Semiconductor Manufacturing Company Limited \(TSM\) CEO C. C. Wei on Q1 2022 Results - Earnings Call Transcript](#)

[Western Digital Corporation \(WDC\) Presents at Morgan Stanley 2022 Technology, Media & Telecom Conference \(Transcript\)](#)

[Cisco Systems, Inc. \(CSCO\) Management Presents at Morgan Stanley Technology, Media and Telecom Conference 2022 Transcript](#)

[International Business Machines Corporation \(IBM\) Management Presents at Morgan Stanley Technology, Media and Telecom Brokers Conference 2022 \[Transcript\]](#)

[Texas Instruments Incorporated \(TXN\) CEO Rich Templeton Presents at Morgan Stanley 2022 Technology, Media & Telecom Conference \(Transcript\)](#)

[IDT Corporation \(IDT\) CEO Shmuel Jonas on Q2 2022 Results - Earnings Call Transcript](#)

# Links to Conference Call Transcripts

[Lam Research Corporation's \(LRCX\) Management Presents at Morgan Stanley Technology, Media and Telecom Conference 2022 \(Transcript\)](#)

[NXP Semiconductors N.V. \(NXPI\) Presents at Morgan Stanley Tech Conference, San Francisco Conference \(Transcript\)](#)

[Intel Corporation \(INTC\) CEO Patrick Gelsinger Presents at Morgan Stanley Technology, Media and Telecom Conference 2022 \(Transcript\)](#)

[NVIDIA Corporation \(NVDA\) Presents at Morgan Stanley 2022 Technology, Media and Telecom Conference \(Transcript\)](#)

[Thermo Fisher Scientific Inc. \(TMO\) CEO Marc Casper on 42nd Annual Cowen Health Care Conference \(Transcript\)](#)

[Qorvo \(QRVO\) CEO, Bob Bruggeworth Presents at Raymond James 43rd Annual Institutional Investors Conference - Company Call Transcript](#)

[Broadcom's \(AVGO\) CEO Hock Tan on Q1 2022 Results - Earnings Call Transcript](#)

[VAT Group AG \(VACNY\) CEO Mike Allison on Q4 2021 Results - Earnings Call Transcript](#)

[Dell Technologies Inc. \(DELL\) Management on Q4 2022 Results - Earnings Call Transcript](#)

[AIXTRON SE \(AIXXF\) CEO Felix Grawert on Q4 2021 Results - Earnings Call Transcript](#)

[ChipMOS TECHNOLOGIES INC. \(IMOS\) Q4 2021 Results - Earnings Call Transcript](#)

[ASM International NV \(ASMIY\) CEO Benjamin Loh on Q4 2021 Results - Earnings Call Transcript](#)

[SkyWater Technology, Inc. \(SKYT\) CEO Thomas Sonderman on Q4 2021 Results - Earnings Call Transcript](#)

[Lenovo Group Limited \(LNVGY\) CEO Yang Yuanqing On Q3 2022 Results - Earnings Call Transcript](#)

[ASM Pacific Technology Limited \(ASMFV\) CEO Robin Gerard Ng on Q4 2021 Results - Earnings Call Transcript](#)



# Links to Conference Call Transcripts

[Agilent Technologies, Inc.'s \(A\) CEO Mike McMullen on Q1 2022 Results - Earnings Call Transcript](#)

[BE Semiconductor Industries N.V. \(BESY\) CEO Richard Blickman on Q4 2021 Results - Earnings Call Transcript](#)

[Keysight Technologies, Inc. \(KEYS\) CEO Ronald Nersesian on Q1 2022 Results - Earnings Call Transcript](#)

[NVIDIA Corporation's \(NVDA\) CEO Jensen Huang on Q4 2022 Results - Earnings Call Transcript](#)

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