PHLX Semiconductor Sector Index™

Investing in the Next Generation of Technology Innovators
Acceleration in Demand Due to Covid-19

Videogames are a bigger industry than movies and North American sports combined, thanks to the pandemic


Sources: MarketWatch, The Verge.

Smartphone industry roars back in Q4 2020 as iPhone propels Apple to new heights

The past 12 months as a whole may have been challenging for the smartphone industry, but the industry enjoyed an end-of-year renaissance driven by a staggering $66bn worth of iPhone sales.

The PC market just had its first big growth in 10 years

The PC is far from dead

How Covid led to a $60 billion global chip shortage for the auto industry

Sources: CNBC, ComputerWeekly.com
SOX™ Index Composition

Source: Nasdaq Global Indexes as of May 28, 2021

Top 10 vs. Rest of Index

Top 10 Index % Weights as of May 28, 2021

- NVIDIA CORPORATION: 9.2%
- TEXAS INSTRUMENTS: 8.6%
- BROADCOM INC.: 7.8%
- QUALCOMM INC: 7.7%
- INTEL CORP: 7.3%
- APPLIED MATERIALS: 7.3%
- NXP SEMICONDUCTORS: 7.7%
- LAM RESEARCH CORP: 7.7%
- ASML HLDG NY REG: 4.4%
- ANALOG DEVICES CMN: 4.6%
Market Cap/Subsector/Globality Profile

Index % Weights by Market Cap
- $100B+: 26.3%
- $50~100B: 53.3%
- <$50B: 20.4%

- # of $100B+ Companies: 5
- # of $50~100B Companies: 12
- # of <$50B Companies: 13

Index % Weights by ICB Subsector
- Semiconductors: 76.3%
- Production Technology Equipment: 22.8%
- Electronic Equipment: Control and Filter: 0.9%

- # of Semiconductors: 20
- # of Other Subsectors: 10

Index % Weights by Domicile Country
- US: 84.2%
- International: 15.8%

- # of US-Domiciled: 26
- # of International: 4

Source: Nasdaq Global Indexes, FactSet, Bloomberg as of May 28, 2021
## SOX vs. Competitors: Highlights

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Index Ticker</th>
<th>Weighting Description</th>
<th>Weighting Constraints</th>
<th>Industry Classification</th>
<th>Launch Year</th>
<th>Count</th>
<th>Listing Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHLX Semiconductor Sector Index</td>
<td>SOX</td>
<td>Modified Market Cap-Weighted</td>
<td>8% cap for Top 5; 4% cap for rest</td>
<td>ICB: Semiconductors and Production Technology Equipment</td>
<td>1993</td>
<td>30</td>
<td>Nasdaq/NYSE/CBOE</td>
</tr>
<tr>
<td>MVIS US Listed Semiconductor 25 Index</td>
<td>MVSMHTR</td>
<td>Modified Free Float Market Cap-Weighted</td>
<td>4.5%/20%/50% capping*</td>
<td>At least 50% revenues from Semiconductors and semiconductor equipment</td>
<td>2011</td>
<td>25</td>
<td>Nasdaq/NYSE/CBOE</td>
</tr>
<tr>
<td>ICE Semiconductor Index</td>
<td>ICESEMI</td>
<td>Modified Float Market Cap-Weighted</td>
<td>8% cap for Top 5; 4% cap for rest</td>
<td>ICE: Semiconductors</td>
<td>2021</td>
<td>30</td>
<td>Nasdaq/NYSE/CBOE</td>
</tr>
</tbody>
</table>

* Small weights stock 0~4.5%; large weights stock 5~20%; split between small and large weights groups 50%:50%

Source: Nasdaq Global Indexes, MVIS Indices, ICE Data Indices as of May 28, 2021.
# SOX vs. Competitors: Methodology Details

<table>
<thead>
<tr>
<th>Index Name</th>
<th>Index Ticker</th>
<th>Reconstitution Schedule</th>
<th>Rebalance Schedule</th>
<th>Minimum Market Cap Constraints</th>
<th>Minimum Liquidity Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHLX Semiconductor Sector Index</td>
<td>SOX</td>
<td>Annually in September</td>
<td>Quarterly in Mar., Jun., Sept. Dec.</td>
<td>$100M</td>
<td>1.5M shares in each of 6 months including reference date</td>
</tr>
<tr>
<td>MVIS US Listed Semiconductor 25 Index</td>
<td>MVSMHTR</td>
<td>Semi-annually in March and September</td>
<td>Quarterly in Feb., May, Aug., Nov.</td>
<td>$150M</td>
<td>250k shares per month and $1M average daily dollar trading volume in each of 6 months</td>
</tr>
<tr>
<td>ICE Semiconductor Index</td>
<td>ICESEMI</td>
<td>Annually in September</td>
<td>Quarterly in Mar., Jun., Sept. Dec.</td>
<td>$100M</td>
<td>1.5M shares in each of 6 months including reference date</td>
</tr>
</tbody>
</table>

Source: Nasdaq Global Indexes, MVIS Indices, ICE Data Indices as of May 28, 2021.
# MVIS Semiconductor Index (SMH) vs. SOX Overlap

## SMH Only:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Company Name</th>
<th>SMH %</th>
<th>SOX %</th>
</tr>
</thead>
<tbody>
<tr>
<td>XLNX</td>
<td>Xilinx Inc</td>
<td>2.36</td>
<td>-</td>
</tr>
<tr>
<td>CDNS</td>
<td>Cadence Design Systems Inc</td>
<td>2.25</td>
<td>-</td>
</tr>
<tr>
<td>STM</td>
<td>STmicroelectronics Nv</td>
<td>2.00</td>
<td>-</td>
</tr>
<tr>
<td>MXIM</td>
<td>Maxim Integrated Products Inc</td>
<td>1.82</td>
<td>-</td>
</tr>
<tr>
<td>OLED</td>
<td>Universal Display Corp</td>
<td>0.70</td>
<td>-</td>
</tr>
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</table>

## SOX Only:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Company Name</th>
<th>SMH %</th>
<th>SOX %</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPWR</td>
<td>MONOLITHIC POWER SYS</td>
<td>-</td>
<td>1.31</td>
</tr>
<tr>
<td>ENTG</td>
<td>ENTEGRIS INC</td>
<td>-</td>
<td>1.31</td>
</tr>
<tr>
<td>IPGP</td>
<td>IPG PHOTONICS CORP</td>
<td>-</td>
<td>0.95</td>
</tr>
<tr>
<td>CREE</td>
<td>CREE, INC.</td>
<td>-</td>
<td>0.94</td>
</tr>
<tr>
<td>MKSI</td>
<td>MKS INSTRUMENTS INC</td>
<td>-</td>
<td>0.88</td>
</tr>
<tr>
<td>BRKS</td>
<td>BROOKS AUTOMATION</td>
<td>-</td>
<td>0.64</td>
</tr>
<tr>
<td>LSCC</td>
<td>LATTICE SEMICOND</td>
<td>-</td>
<td>0.61</td>
</tr>
<tr>
<td>IIVI</td>
<td>I I V I INC</td>
<td>-</td>
<td>0.60</td>
</tr>
<tr>
<td>SLAB</td>
<td>SILICON LABS INC</td>
<td>-</td>
<td>0.51</td>
</tr>
<tr>
<td>CCMP</td>
<td>CMC MATERIALS, INC.</td>
<td>-</td>
<td>0.38</td>
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## % Weight and # Security:

<table>
<thead>
<tr>
<th></th>
<th>% Weight</th>
<th># Security</th>
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</thead>
<tbody>
<tr>
<td>SMH Only</td>
<td>9.1</td>
<td>5</td>
</tr>
<tr>
<td>Overlapping in SMH</td>
<td>90.9</td>
<td>20</td>
</tr>
<tr>
<td>Overlapping in SOX</td>
<td>91.9</td>
<td>20</td>
</tr>
<tr>
<td>SOX Only</td>
<td>8.1</td>
<td>10</td>
</tr>
</tbody>
</table>

## Top 5 Active Weighted Stocks in SMH

<table>
<thead>
<tr>
<th>Stock</th>
<th>SMH %</th>
<th>SOX %</th>
<th>Abs. Active %</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSM</td>
<td>14.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTC</td>
<td>11.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASML</td>
<td>7.33</td>
<td>6.10</td>
<td></td>
</tr>
<tr>
<td>NVDA</td>
<td>8.62</td>
<td>9.24</td>
<td></td>
</tr>
<tr>
<td>LRCX</td>
<td>5.07</td>
<td>4.47</td>
<td></td>
</tr>
</tbody>
</table>

Performance Since Inception of ICESEMI Backtest

Source: Nasdaq Global Indexes, FactSet, Bloomberg as of May 28, 2021
YTD 2021 Performance

Total Return Performance vs. Competitor Indexes

- XSOX, 14.5%
- MVSMHTRG, 14.2%
- ICESEMIT, 14.2%

Price Performance vs. Market Benchmarks

- SPX
- NDX
- NDXT
- SOX

Source: Nasdaq Global Indexes, FactSet, Bloomberg as of May 28, 2021
Full-Year 2020 Performance

Total Return Performance vs. Competitor Indexes

- XSOX
- MVSMHTRG
- ICESEMIT

Price Performance vs. Market Benchmarks

- SPX
- NDX
- COMP
- SOX

Source: Nasdaq Global Indexes, FactSet, Bloomberg
Performance Throughout the 2010s

2010-2019 Performance vs. Market Benchmarks

Source: Nasdaq Global Indexes, FactSet, Bloomberg as of May 28, 2021
SOX ETF AUM Trend

3-Year Global ETF AUM thru May 31, 2021 ($Bn)

Source: Nasdaq Global Indexes, Bloomberg.

ETFs currently tracking SOX include the iShares PHLX Semiconductor ETF (Ticker: SOXX), the Direxion Daily Semiconductor Bear 3x Shares (Ticker: SOXS), the Direxion Daily Semiconductor Bull 3x Shares (Ticker: SOXL), the Cathay U.S. PHLX Semiconductor Sector ETF (Ticker: 00830), listed in Taiwan, and the MIRAE Asset Tiger US PHLX Semiconductor Nasdaq ETF (Ticker: 381180), listed in South Korea.

+387% since low on March 20, 2020
SOX Performance Driven by Fundamentals

Top 15 Index Weights: Last 12 Months Performance as of May 31, 2021

- NVDA: 91.6%
- TXN: 67.2%
- AVGO: 71.7%
- QCOM: 75.6%
- INTC: 66.1%
- AMAT: 54.8%
- NXPI: 50.7%
- LRCX: 83.5%
- ASML: 81.1%
- ADI: 83.5%
- KLAC: 145.4%
- AMD: 112.0%
- TSM: 154.3%
- MU: 114.7%
- MCHP: 114.7%

Average: 87%

5-Year Trend in Revenue & Net Income, $B as of May 31, 2021

- Revenue CAGR: 10%
- Net Income CAGR: 22%

Source: Nasdaq Global Indexes, Bloomberg.
Semiconductors in 2021

7 Semiconductor Component Types:

- Memory (largest share of industry, ~25%)
  - Cloud Computing/Virtual Reality
- Microcomponent (every electronic device)
- Logic
  - ASIC (application-specific integrated circuits) + ASSP (application-specific logic chips)
- Analog
  - Power Management/Signal Conversion/Automotive
- Optoelectronic
  - Image Recognition/Internet of Things/Solid-State Lighting/Machine Vision/Smart-Grid Energy
- Sensor
  - Automated Controls / IoT Applications
- Discrete

Top Drivers / Sources of Growth:

- Automotive (Autonomous/EV/Hybrid): 11.9% CAGR
- Industrial (Security/Healthcare): 10.8% CAGR
- Communications (Smartphones, 5G, EM): 2.2% CAGR
- Consumer Electronics (TVs/Gaming/Handhelds): 6.0% CAGR
  - Wearables (21.0% CAGR)
- Data Processing (Servers/Storage Devices): 2.1%
- Internet of Things (IoT)
- Artificial Intelligence & Machine Learning: ~50%
- LEDs

Source: Nasdaq Global Indexes, PricewaterhouseCoopers
Semiconductor Diversity

Last 12 Months of Total Revenue by Company, $Bn, as of August 31, 2020

Test, Measurement & Metrology Equipment 66% #1
Video Multimedia: 70% / #2
Microprocessors: 30% / #2
Front-End Processing 100% #2
Video Multimedia 94% #1
General Analog/Mixed Signal 71% #1
Photolithography 98% #1
Front-End Processing 88% #1
Communications 81% #1
Volatile Memory 83% #1
RF/Analog/Mixed Signal 77% #1
Semiconductor Foundry 96% of Revenue Ranked #1 Globally
Specialty Analog/Mixed Signal 47% #1
Microprocessor 84% of Intel's Revenue Ranked #1 Globally

Source: Nasdaq Global Indexes, FactSet, Bloomberg
A New Era of Semiconductor Investment

Estimated US Venture Capital Investments into Semiconductor Startups, $Bn

<table>
<thead>
<tr>
<th>Year</th>
<th>1.5</th>
<th>6</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

“Ten Years Ago You Couldn’t Do a Hardware Start-Up” — Jim Keller, veteran chip designer

Forecasted Growth of Global Chip Revenues, $Bn

<table>
<thead>
<tr>
<th>Year</th>
<th>2021</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>CY '18</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>CY '19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY '20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY '21E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY '22E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CY '23E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

“This is a lasting growth cycle, not a short spike” — Kurt Sievers, CEO of NXP

Intel + Taiwan Semiconductor Annual CapEx, $Bn

<table>
<thead>
<tr>
<th>Year</th>
<th>CY '18</th>
<th>CY '19</th>
<th>CY '20</th>
<th>CY '21E</th>
<th>CY '22E</th>
<th>CY '23E</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25.7</td>
<td>31.1</td>
<td>32.3</td>
<td>49.7</td>
<td>53.1</td>
<td>54.8</td>
</tr>
</tbody>
</table>

“We are setting a course for a new era of innovation and product leadership at Intel,” — Pat Gelsinger, CEO

Sources: NYTimes, CB Insights, Factset, Intel.
Semiconductor Revenues up 100% Since 2009

Growth in Semiconductor Revenue by Industry of Usage, $Bn

Source: IDC Data via Bloomberg
Semiconductor Revenues up 100% Since 2009

Growth in Semiconductor Revenue by Component Type

Source: IDC Data via Bloomberg