

TTM Technologies, Inc. is a leading global manufacturer of technology products, including mission systems, radio frequency (“RF”) components, RF microwave / microelectronic assemblies, and technologically advanced interconnect products, including printed circuit boards (“PCB”)s and substrates. TTM stands for time-to-market, representing how TTM's time-critical, one-stop design, engineering and manufacturing services enable customers to reduce the time required to develop new products and bring them to market. Additional information can be found at www.ttm.com.

Headquarter

Santa Ana, CA, United States

Founded

1998 - Publicly Listed: NASDAQ TTTM

Talented Employees

18,000+ Employees, 1,800+ Engineers and Technology Professionals

Total Facilities

22 Factories in Operation Worldwide

Operations

2 Sectors, 5 Business Units

Aerospace & Defense Sector

- Integrated Electronics (“IE”)
- Interconnect Solutions (“IS”)
- RF & Specialty Components (“RF&S”)

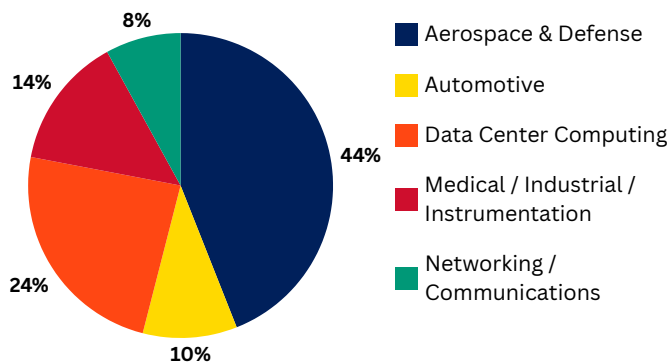
Commercial Sector

- Automotive & Medical, Industrial & Instrumentation (“AMI&I”)
- Communications and Computing (“C&C”)

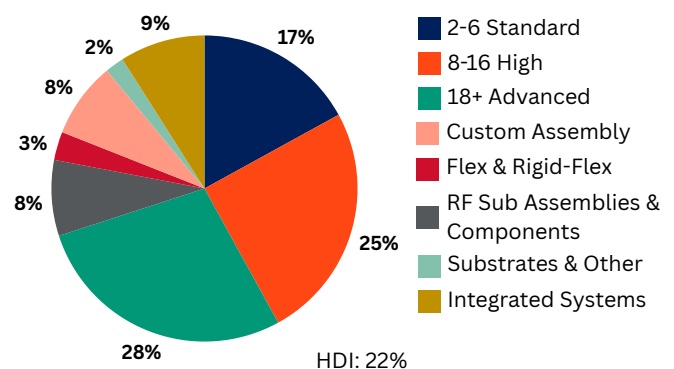
TTM’s Market Diversification

FY2025 net sales of US\$2.9B

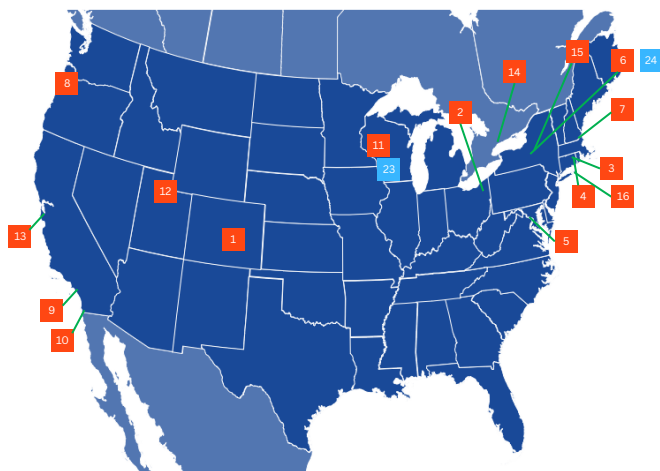
END MARKETS



Product Types

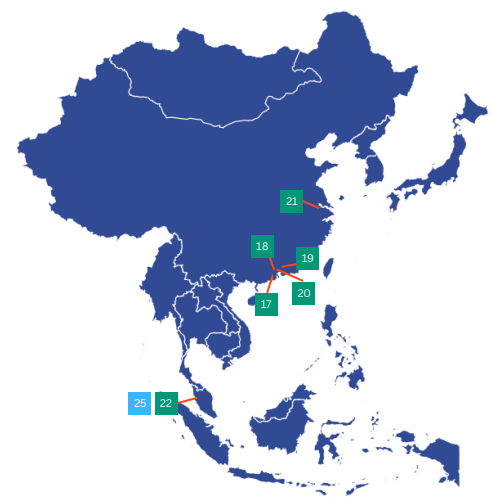


Global Footprint



North America Operations

- | | | |
|--------------------------|-------------------------|-----------------------|
| 1. Denver – DEN | 7. Salem – SAL | 13. San Jose – SJ |
| 2. North Jackson – NJ | 8. Forest Grove – FG | 14. Toronto – TOR |
| 3. Stafford – ST | 9. Santa Ana – SA | 15. Syracuse – SYR-W |
| 4. Stafford Springs – SS | 10. San Diego – SD | 16. Farmingdale – FRM |
| 5. Sterling – STE | 11. Chippewa Falls – CF | 17. Eau Claire – ECL |
| 6. Syracuse – SYR | 12. Logan – LG | 18. Syracuse – SYD |



Asia Pacific Operations

- | | |
|--------------------|---------------------|
| 17. Zhongshan – ZS | 21. Suzhou – SUZ |
| 18. Guangzhou – GZ | 22. Penang – PNG |
| 19. Huiyang – HY | 23. Penang – PNG II |
| 20. Dongguan – DMC | |

Note: As of May, 2025

Future Plants

End Market Applications

Aerospace & Defense

- Design-to-Spec & Build-to-Print product offerings
- Full complement of software platforms - HFSS, Thermal, Solidworks, Allegro, Xpedition, Altium
- Custom build or Build-to-Print components and sub-assemblies to end-market mission-critical systems
- Complex RF with mixed dielectrics
- HDI & Ultra-HDI PCB's - 75um lines & spacing
- Substrates - 17um lines and spacing
- Flex & Rigid-Flex
- Microwave, Low loss and ultra low loss material offerings

Data Center Computing

- Stacked Microvia / Advanced HDI Technology
- Stepped Finger Technology
- Asymmetrical N+M Technology
- 56Gbps 400G / 112Gbps 800G
- Multiple Lamination PCB
- Ultra-low loss / Low-loss materials
- Advanced Signal Integrity Performance
- PCIe Gen 5 / 6 technology

Networking

- Asymmetrical N+M Technology
- >30:1 High Aspect Ratio Plating
- Insertion Loss Testing up to 67GHz
- 112Gbps 800G / 224Gbps 1.6T
- High Layer, 40+
- Extreme Low Loss + Materials
- Precision Backdrilling for reduced / stubless channels
- Advanced Signal Integrity Performance

Automotive

- mmWave radar up to 110GHz
- Thermal solutions with coins, inlays and up to 12oz Cu
- High voltage solutions for 1,500V+ including long term reliability / CAF
- Precision etch and registration technology
- Advanced HDI
- Low loss materials
- IATF16949

Medical & Industrial

- Burn In Boards ("BIB")
- Symmetrical A+B with Microvias stack-ups
- RF / Digital mixed dielectrics
- Multilayer Deep Skip Vias
- Oversized Panels
- Complex Rigid-Flex
- Device Under Test PCBs ("DUT")
- Buried Resistance ("BR") & Buried Capacitor ("BC")
- Advanced HDI

Complete Portfolio of Diversified Technologies and Solution Offerings

Printed Circuit Boards

- Asymmetrical N+M PCB
 - Advanced HDI PCB
 - Over-Sized PCB
 - Conventional PCB
 - Flex / Rigid-Flex PCB
 - RF and Microwave PCB
 - Substrates
 - Sintered Paste Interconnect Solutions
- Thermal Management

RF and Specialty Components

- Xinger®
- RF Passive Components up to 40GHz
- RF Terminations & Attenuators up to 81GHz
- mmWave Filters, Power Dividers, Antennas & Terminations
- Circulators
- High-Density, Multilayer LTCC Power & Resistive Solutions
- High-Frequency Etched Precision Thick-Film Substrates High-Power Resistive Components
- All RF and Microwave markets served

RF and Microwave

- Innovative Packaging for Achieving Complex, High RF Signal Functional Density Subsystems
- Wideband Converters and Receivers
- Design-to-Spec & Engineering Support for Collaborative Designs
- Circulators

Microelectronics

- High-Performance, Radiation-Hardened and Space-Qualified Microelectronics
- Custom ICs (ASICs)
- Power Management, Amplifiers and Motor Control Products
- High Temperature Products & Thermal Management Solutions
- Custom Hybrids and Multi-Chip Module ("MCM") Design, Fab, and Test
- Ceramics

Engineered Systems

- Integrated Radar Systems
- Sense & Avoid Solutions for Autonomous Flight
- All-Mode IFF Interrogators
- Integrated Sensor and Man-Portable Systems
- Mode 5 Operational Autonomous Surveillance ("MSOAS") System
- Wired & Wireless Secure Digital Intercom Systems
- Thermal Management Solutions

Advanced PCB & Substrates Product Lines

HDI / NextGen HDI

- Multi-level Microvia
- Sintered Paste Interconnect
- Fine Lines / Spaces
- 6+ Laminations

Rigid-Flex Fab.

- High-Speed & High-Temp
- 38+ Layers
- HDI Capable
- Bookbinder

RF / Microwave

- Cavities
- Foam
- Radomes
- Large Form Factor

Substrates

- ABF, HyperBGA® and alternative build-up materials substrates
- 17um Lines & Spacing
- Solder on Pad ("SoP")
- Low CTE Cores

Rigid

- Large Form Factor
- Heavy Copper up to 6oz
- Broad Material Offerings
- High-Aspect Ratio

3D Printing

- Prototyping and manufacturing solutions
- DragonFly Pro Systems
- Dedicated team of 3D Engineers

Special Attributes

- Up to 1" thick
- Multi-depth cavities with features
- Air Dielectric
- Controlled depth drilling & milling
- Planar Resistor & Buried Capacitance
- Embedded Discrete Components
- High-Speed Low Loss Materials (all types)
- Thermal Management Solutions (heat sinks, coins, vias, engineered materials & more)
- Composite Encapsulated
- High Layer Count up to 70+ layers
- Large Form Factor
- Optical Precision Machining
- 3D Forming
- Reliability & Failure Analysis Test Lab
- Performance Based Testing (RF / SI)
- Tightly Controlled Impedance
- Multi Surface Finishes
- Channel PanelTM Solutions

Digital Solutions – Engineering & Manufacturing Capabilities

Signal Integrity

- Ansys SiWave
- Polar SI9000-XFE

RF Modeling

- Ansys HFSS

Power Distribution

- AnsysIcepak

PCB Design

- Allegro (Cadence)
- Xpedition (Mentor)
- Altium Designer

Thermal / Mechanical

- SolidWorks Flow Simulation
- SolidWorks Premium

Rigid / HDI PCB Fab.

- HDI & Microvia DCAs
- Heavy Cu / BPAs (54")
- Advanced Interconnect
- Ultra-HDI

Organic Substrates

- Build-up Substrates
- Interposer technology ABF & Alt. Materials
- High Density (17um L / S)
- HyperBGA® & CoreEZ ®

Flex / Rigid-Flex Fab.

- Types 3, 4 +Bookbinder
- Up to 51" Lengths (std)
- High-Speed & High-Temp
- Composite Encapsulated

RF / Microwave

- Fab & Assembly
- Cavities, Foams
- Large Form Factor
- Solution Development (up to 110 GHz)

Metal & Integration

- Metal Fabrication
- Integrated Chassis
- Conformal Coating
- ESS - Thermal & Vibe

Custom Assembly Capabilities & Services

BPA & Specialized PCBA

- Press Fit
- SMT
- Through Hole
- Large Format 36" x 54"
- High Mix
- Low to Medium Volume
- Conformal Coating
- Heatsink & Chassis Integration

Flex & Rigid-Flex Assembly

- Customizable Assembly
- Press Fit
- SMT
- High Speed
- High Temp
- Passive / Active
- Conformal Coating

Custom Metal & Machining

- Multi Axis Machining
- Horizontal & Vertical
- Turret Press
- Water Jet
- Brake Press
- Deburr

Chassis Integration & ESS Testing

- Electro-Mechanical
- Sub-system Assembly
- COTS Systems (VPK)
- Liquid Cooled Systems
- ESS Testing

Integrated Electronics Product Portfolio

Microelectronics

- Designed for Aerospace & Defense
- Meet stringent industry standards including - MIL-PRF-38534 Class H & K (MCM) certified
- Radiation Hardness Assurance ("RHA") Plan certified by the Defense Logistics Agency ("DLA")
- AS9100, ISO9001, and AS9200
- Solutions include
- Custom and Standard Multi-Chip Modules ("MCM"s)
- Custom Mixed-Signal ASICs
- Ceramics
- Advanced Packaging Assembly (2.5 / 3DHI)

Mission Systems

- Advanced radar, surveillance and communications systems serving U.S. & International Militaries
- Air, Land and Sea Applications
- Solutions Include
- Identification Friend or Foe ("IFF")
- Passive & Active systems
- Patented GPS denial of service
- Radar
- Internally Integrated IFF
- AESA & Mechanically Scanned Array Systems
- Communications
- Wired & Wireless Systems
- Fixed-Wing, Rotary-Wing and Lighter than Air applications

RF and Microwave

- Advanced PCBs, Components, & Engineered Solutions
- Solutions for Aerospace & Defense, Automotive, Medical, & Telecommunications end markets
- Air, Land and Sea Applications
- Solutions Include
- Circulators
- Single & Double Junction
- Small form factor, Surface Mount Device ("SMD") pick & place compliant
- Beamforming Networks
- Radar Applications
- Space Based Applications
- Integrated RF & Microwave Assemblies

Advanced Analytical Capabilities & Services

Electrical Signal Integrity

- Test frequency up to 110 GHz
- 2D and 3D SI simulation for PCB and end performance
- Dk / Df measurement on laminate materials and PCB
- VNA (up to 110GHz)
- Time Domain Reflectometry (20GHz and 50GHz)
- Balanced type Circular Disk Resonator ("BCDR") (up to 67GHz)
- Split Cylinder Resonator ("SCR") (30GHz, -40 ~ 150°C)
- Delta-L4.0
- PLTS advanced analysis
- HFSS 2018 and 2022 R1
- Polar SI9000-XFE & InSolver™

Optical Signal Integrity

- Optical insertion loss measurement
- Multi-mode and single-mode light sources and test fibers
- Wavelengths: 650nm, 850nm, 1310nm
- Optical beam near-field pattern ("NFP") analysis (InGaAs camera)
- Ray Trace simulation – Ansys Zemax OpticStudio
- Photonics Simulation – Ansys Lumerical
- Opto-Mechanical System Design

Failure Analysis

- Locate CAF, Micro-short / open at elevated temperature and humidity
- IMC characterization
- Locate delamination and voids by acoustic scan
- Nano-scale thin layer and ICD analysis
- Thermal Emission Microscope
- Focus Ion beaming ("FIB") with SEM&EDS
- Leica EM TXP & Ionic Milling
- Short detector (ESAMBER)
- Confocal Scanning Acoustic Microscopy ("CSAM")
- FTIR with IR microscope

Materials Analysis

- Viscoelastic Properties
- Glass Transition Temperature (Tg) of Laminate
- Coefficient of Thermal Expansion ("CTE")
- Loss Modulus and Storage Modulus
- Decomposition Temperature (Td)
- Rheometer
- Differential Scanning Calorimetry ("DSC")
- Thermogravimetric analysis ("TGA")
- Dynamic mechanical analysis ("DMA")
- Thermomechanical analysis ("TMA")
- High-performance liquid chromatography ("HPLC")

Surface Analysis

- Roughness and Profile
- Electro-chemical surface analysis
- Warpage with reflow profile (TherMoire: 820mm x 600mm, double sides heating)

Reliability

- 2000V-CAF
- CITC, HATS & OM thermal stress
- Comparative Track Index up to 1200V
- Partial discharge up to 5.0 kV

