Tower
Semiconductor

Where **Analog** and **Value** Meet

CORPORATE OVERVIEW

Our Vision

Provide the highest value analog semiconductor solutions as validated by our customers, employees, shareholders, and partners.

Our Mission

Being a trusted long-term partner with a positive and sustainable impact on the world through innovative analog technologies and operational solutions.

Our Value Vectors™

Partnership

We are a trusted long-term partner for customers, employees and shareholders.

Impact

We are committed to making a positive and sustainable impact on the world.

Excellence

Quality, Efficiency, Effectiveness

Embedded in everything that we do

We pursue excellence in everything we do, from ideation to product shipment. Hence, we deliver the best experience to our customers and employees.

Leadership

We lead the analog ecosystem with technology and operational solutions in exciting and growing markets.

Innnovation

We move great ideas into value in an environment of innovation.

At a Glance...

Our Value

Providing the highest value analog semiconductor technology and operational solutions, based upon unparalleled trust, strategic customer roadmap and success alignment.

Our Technology

We lead the analog ecosystem with high-quality, innovative technology solutions solutions, and provide strong competitive advantages in various growing markets by offering the widest range of customized analog technologies such as Radio Frequency and High-Performance Analog, Power Management, CMOS Image Sensors, Non-Imaging Sensors, and MEMs with cutting edge, innovative market solutions for our diversified and continuously expanding customer base. With ever-evolving capabilities and an innovative mindset, we focus on areas where we can provide strong competitive advantages through win-win differentiated solutions, enabling our customers to lead in their market segments.

Our Operational Capabilities

Strong global presence in North America, Europe, and Asia, operating multiple world-class operational facilities (150mm, 200mm and 300mm) worldwide, fulfilling growing customer demand and providing capacity assurance, operational flexibility, with geographically spread dual-sourcing capabilities.

Our Finance

Strong financial foundation and business model with focus on margin expansion and free cash flow generation; enabling continuous realization of growth and value-add opportunities.

Our People

Over 5,500 worldwide highly devoted, talented, creative, and skilled employees with broad knowledge, specialized expertise, and profound experience.

Our Business Units

Radio Frequency and High-Performance Analog:
Enabling a New Era of Communication

We provide industry-leading, low-loss, high-dynamic range technologies from wireless RF to mmWave communications. Our SiGe BiCMOS, RF-SOI and RF-CMOS technology solutions enable high-speed, low-noise and low-power products for consumer, infrastructure, and automotive applications.

Power Management:
Emppowering Efficiency - Shaping Tomorrow

Our power management platform provides highly modular, industry-leading BCD technologies, with best-in-class power efficiency across a wide range of voltages, delivering comprehensive solutions for the consumer, industrial, infrastructure, automotive, and medical markets.

CMOS Image Sensors:
Cutting Edge Imaging Solutions Customized for Your Needs

We offer high-end, state-of-the-art technology solutions, unique customization processes, and unmatched design flexibility, enabling performance-optimized pixel technology with advanced features, and reduced die size, addressing automotive, machine vision, high-end photography and cinematography, medical, 3D, AR/VR and security applications.
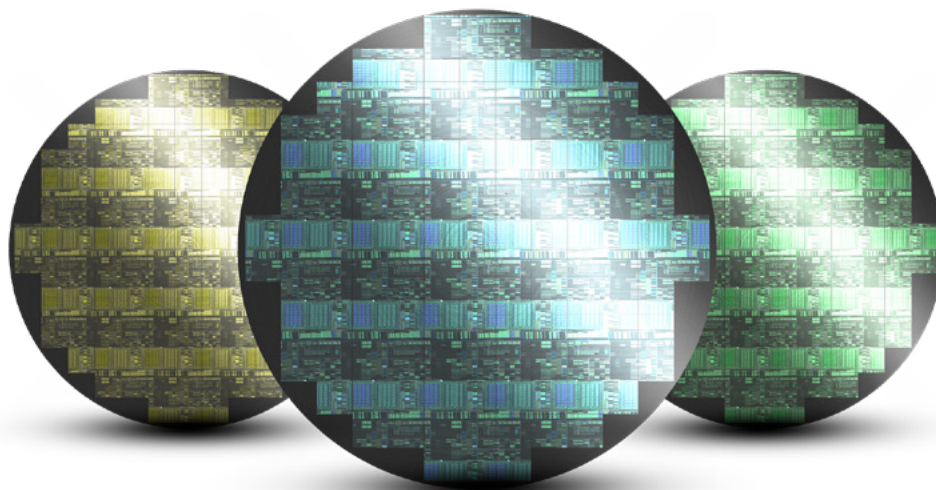
Sensors and Displays:
Expand the Sensing Capabilities - Lead the World of Sensors

Our proven and flexible capabilities and technological platforms enable fabrication of diverse sensing devices consisting of unique ionizing radiation sensors, remote temperature sensors, magnetic (TMR), UV radiation and gas sensors. In addition, we supply technology for LCOS and OLED on Silicon display backplanes with dedicated flows for high Brightness micro-displays.

Automotive:
Innovative Analog Solutions for Smarter Automobiles

Our broad range of mature and modular analog technology platforms for sensors and displays, wireless and wireline communications, mixed signal, and power management provide the most comprehensive and advanced solutions for electrified autonomous vehicles.

Global Facilities and Technological Excellence

Through our multiple global facilities, in Israel, Europe, US and Japan, we provide capacity assurance with high quality and flexible operational capabilities serving fabless companies and IDMs looking to increase production capacity and geographic diversify. We operate two facilities in Israel (150mm and 200mm), two in the U.S. (200mm), two in Japan (one 200mm and one 300mm). In addition, we also have a 300mm capacity through a shared facility in Agrate, Italy, as well as through a capacity corridor in a 300mm Intel factory in New Mexico.

In order to support the increasing demand across all of our business units, numerous end markets and products, we expanded our operational capacity in a few of our facilities, while maintaining superb KPIs.

Map Labels

San Jose, CA, USA
Sales and support office

Virginia, USA
Sales and support office

UK and France
Sales rep. office

Migdal Haemek, Israel

Shanghai, China
Sales and support office

Uozu, Japan

Newport Beach, CA, USA

Rio Rancho, NM, USA

San Antonio, TX, USA

Agrate, Italy

Migdal Haemek, Israel

Netanya, Israel
Worldwide Design Center

Hsinchu, Taiwan
Sales and support office

Seongnam, South Korea
Sales and support office

Tonami, Japan

Nagaokakyo, Japan
Support office

Facility Details

Migdal Haemek, Israel
- 6" (150mm)
- CMOS, CIS, Power, Power Discrete
- 1µm to 0.35µm
- Planarized BEOL, W and Oxide CMP

Migdal Haemek, Israel
- 8" (200mm)
- CMOS, CIS, Power, Power Discrete, RF Analog, MEMS
- 0.18µm to 0.13µm
- Cu and Al BEOL, EPI, 193nm Scanner

Newport Beach,Ca, USA
- 8" (200mm)
- CMOS, CIS, RF Analog, MEMS
- 0.18µm to 0.13µm
- Al BEOL, SiGe, EPI

San Antonio, TX, USA
- 8" (200mm)
- Power, RF Analog
- 0.18µm
- Al BEOL

Rio Rancho,NM, USA
- 12" (300mm)
- RF SOI
- Power
- 0.18µm

Agrate,Italy
- 12" (300mm)
- Analog RF, Power, Displays
- 65nm

Uozu,Japan
- 12" (300mm)
- Analog, CMOS, CIS, RFCMOS/ SOI
- 65nm and 45nm

Tonami, Japan
- 8" (200mm)
- Analog, Power Discrete, NVM, CCD
- 0.35µm to 0.15µm

Committed to excellence in everything we do, we continuously leverage our operational performance into greater levels. With our firm reputation as a leading foundry providing unique, high-end, analog technology capabilities, along with our on-going market alignment, we wisely invest in our worldwide facilities to best support the ever-evolving needs and growing demand of our customer base.

Radio Frequency and High-Performance Analog

Providing industry-leading, low-loss, high-dynamic range technologies from wireless RF to mmWave communications

RF Technology for Mobile Communications

Our technology is leading an active role in enabling the proliferation of 5G systems supporting unprecedented bandwidth in mobile devices through the development and high-volume processes of new, higher speed, lower power RF technologies. The 5G upgrade cycle started in 2020 but is expected to continue through the next several years. Our industry leading RF platform offering includes:

RF SOI

With a strong reputation for best-in-class performance, Tower's RF SOI technology provides an exceptionally low Ron-Coff figure of merit and high breakdown voltages to enable low insertion loss and high linearity RF switches, antenna tuners, and low-noise-amplifiers to support high data rates and low power consumption, serving the comprehensive needs of 5G enabled handsets.

RF SiGe

With best-in class noise figure and linearity, SiGe enables not only the highest performance low-noise-amplifiers for applications that include handset receivers, but also higher performance applications such as GPS and satellite receivers. Also, more cost-effective than III-V technologies, SiGe enables a class of low-power power amplifiers for WiFi, bluetooth and IoT that proliferate new communication devices. And finally, due to its inherent superb high frequency performance, SiGe is used in mmWave applications, such as automotive radar and satellite communications receivers.

High Performance Analog for Optical Infrastructure

We are a recognized leader in SiGe and SiPho technology for optical transceivers. Our SiGe platform is designed to provide the bandwidth and level of quality required for current high volume 100Gb/s systems, as well as the newest standards stretching to 800Gb/s and beyond. Our SiPho technology was one of the first and still remains one of the few open foundry SiPho technologies, and as such, has gained wide acceptance. Served markets include data centers as well as telecommunication networks globally. The following is a brief description of our leading technologies in this area:

High Performance SiGe

Offering superior performance of >300GHz transistor speed supporting next-generation transceivers for 800Gbps and beyond. We partner with industry leaders to continuously update our roadmap and provide best-in-class SiGe performance to serve the optical transceiver market.

Silicon Photonics (SiPho)

Volume production technology providing area-optimized solutions with integrated optical detectors, waveguides, and modulators on a single die, enabling significant cost advantages due to high levels of integration and replacing the assembly of discrete components in optical modules. Prototyping now also with integrated III-V components such as lasers that dramatically simplify our customers' supply chain and provide them and the optical industry an even stronger value proposition. Tower is the only foundry currently providing such a highly integrated SiPho technology.

Exciting New Markets for SiPho

As our SiPho foundry platform for data-com matures, it is providing a robust and suitable base for adding highly differentiated features that are enabling exciting new and growing markets such as solid-state coherent LiDARs for both automotive and industrial (robots and drones), fiber optic gyroscopes (FOG), high precision medical sensors, photonics-based computing, and AI accelerators. These markets, while nascent today, are expected to show exploding growth over the coming years, and Tower's SiPho platform is well positioned to capitalize on it.

Power Management

Our power management technology provides best-in-class power efficiency for automotive, consumer, industrial, infrastructure, and medical end-applications through modular, industry-leading BCD platforms across a wide range of voltage requirements

65nm BCD

Addressing the largest portion of the power IC market, our 65nm BCD is the leading BCD (Bipolar-CMOS-DMOS) technology for low voltage market segments providing the highest power efficiency, best digital integration capability (replacing a 'multiple chip' module) and superior cost effectiveness through both low mask count and smallest die size. The platform offers strong competitive advantages for products up to 24V operation such as PMICs, load switches, DC-DC converters, LED drivers, motor drivers, battery management, and analog and digital controllers, among others.

We continue to broaden our low-voltage offerings through the addition of new features to our very popular 300mm, 65nm BCD process to best suit the needs of the various markets served.

180nm BCD

Offers optimized power performance with best-inclass low Rdson power LDMOS that is scalable from 12V to 200V operation with multiple isolation schemes enabling advanced integration options, with best-in-class form factor, ideally suitable for applications across multiple markets, including automotive (for maximized hybrid/EVs capabilities, as well as motor controllers and drivers, LED headlights and LiDAR); highly efficient data centers (48V DC-DC) and industrial power applications.

We proceed to expand voltage options and improve power efficiency of our industry-leading 180nm platform serving the automotive, industrial and consumer markets, consistently meeting their developing specifications and requirements.

CMOS Image Sensors

Providing cutting edge imaging and sensing solutions customized for our customers' needs

Aimed at performance-optimized pixel technology, product excellence, design flexibility and broad support, our distinctive processes, and established CMOS Image Sensor (CIS) technologies lead the way to frontier markets and end-applications. Our vast know-how in building pixels designed to spec along with the specialized in-house technology developments continue to set forth a winning platform of leading features with a profound competitive edge.

Our image sensors division serves a variety of market segments, including our long-term retained markets, such as high-end photography (including award winning cinematography and broadcasting cameras), industrial and machine vision, and medical/dental x-ray large sensors, as well as multiple fast growing markets, such as automotive, fingerprint sensors for mobile applications, and Time of Flight (ToF) sensors for mobile face recognition and 3D front looking cameras.

We offer world-leading global shutter (GS) pixel technology as well as advanced stacked copper-to-copper bonding back-side illumination (BSI) wafer technology, providing highly advanced features enabling the development of exciting new products for our world's progressing needs.

Over the past years, we vastly invested in developing specialized technologies, along with building pixels that are designed to spec and silicon proven, enabling profound advantages and opens a path for business growth opportunities

Micro-Displays
Technology for a life-like image quality in AR/VR.

Tower Semiconductor decades of expertise in large scale, high yield image sensor contributes also to micro-displays with the development of dedicated flows for high brightness, low leakage micro OLED displays. Our CMOS 65nm high voltage technology is incredibly valuable in high end AR/VR and XR markets, in particular for state of the art large displays (>1.4″ diagonal) 2-chips solutions.

With the development of advanced devices for small pixels pitch micro-OLED display backplane, Tower Semiconductor supports the most advanced micro displays with high pixel density. Our commitment to the development and improvement of dedicated flows lead to high yield processing.

Non-Imaging Sensors and MEMS

Developing innovative sensing solutions supporting global environmental initiatives for a greener and safer world

Non-imaging sensors

We offer technological platforms for fabricating diverse sensing devices, consisting of unique ionizing radiation (including x-ray and Radon) sensors, remote temperature sensors, magnetic (TMR), UV radiation and gas sensors. In addition, we supply technology for LCOS and uOLED display backplanes, including stitching technology support for large silicon-based displays for the rising demand in the fast-growing VR market. With its proven capabilities and high flexibility, this diverse offering enables the embedding of sophisticated sensors which are in high demand in today's 'connected' world. With our mature technologies and innovation methodology, we develop, facilitate, and support a rich solution span for the sensors' arena.

Remote temperature sensors: provide high sensitivity and accuracy in a broad temperature range, serving the mobile, IoT, industrial, automotive, medical and security markets;

Time-temperature Indicator sensors: CMOS embedded and reusable sensors with no need for power supply, serving the food industry, agriculture, medical and pharmaceutical markets;

Floating gate radiation sensors: reusable sensors with no power supply required and no scintillator, serving radiation monitors, radiation badges, sterilization and Radon detectors;

Magnetic sensors: High Sensitivity Tunnel Magnetoresistance (TMR) sensors for magnetic field strength sensing, serving the industrial , automotive, and consumer markets, as well as the space industry;

UV sensing: solar blind, with record sensitivity and operation at high temperatures, serving applications such as skin protection, flame diagnostics, free space optical communication, sterilization, and industrial automation; and

Gas and humidity sensors: operation at high temperatures, easy and fast reset, and sensor fusion for multiple gases, serving automotive, industrial, medical, and environmental applications. All sensor technologies described above are based on unique platforms developed in-house such as embedded non-volatile floating gate solutions, and MEMS-based membranes, alongside our internal design capabilities that provide embedded electronics to perform full sensor on chip.

MEMS

Focusing on MEMS devices that can be fabricated and scalable to mass volume in a CMOS foundry, we have developed a unique cost-effective platform for MEMS microphones, as well as a one for high end accelerometers. We continue to enrich our platform offering by adding more capabilities to serve additional growing MEMS markets.

Automotive
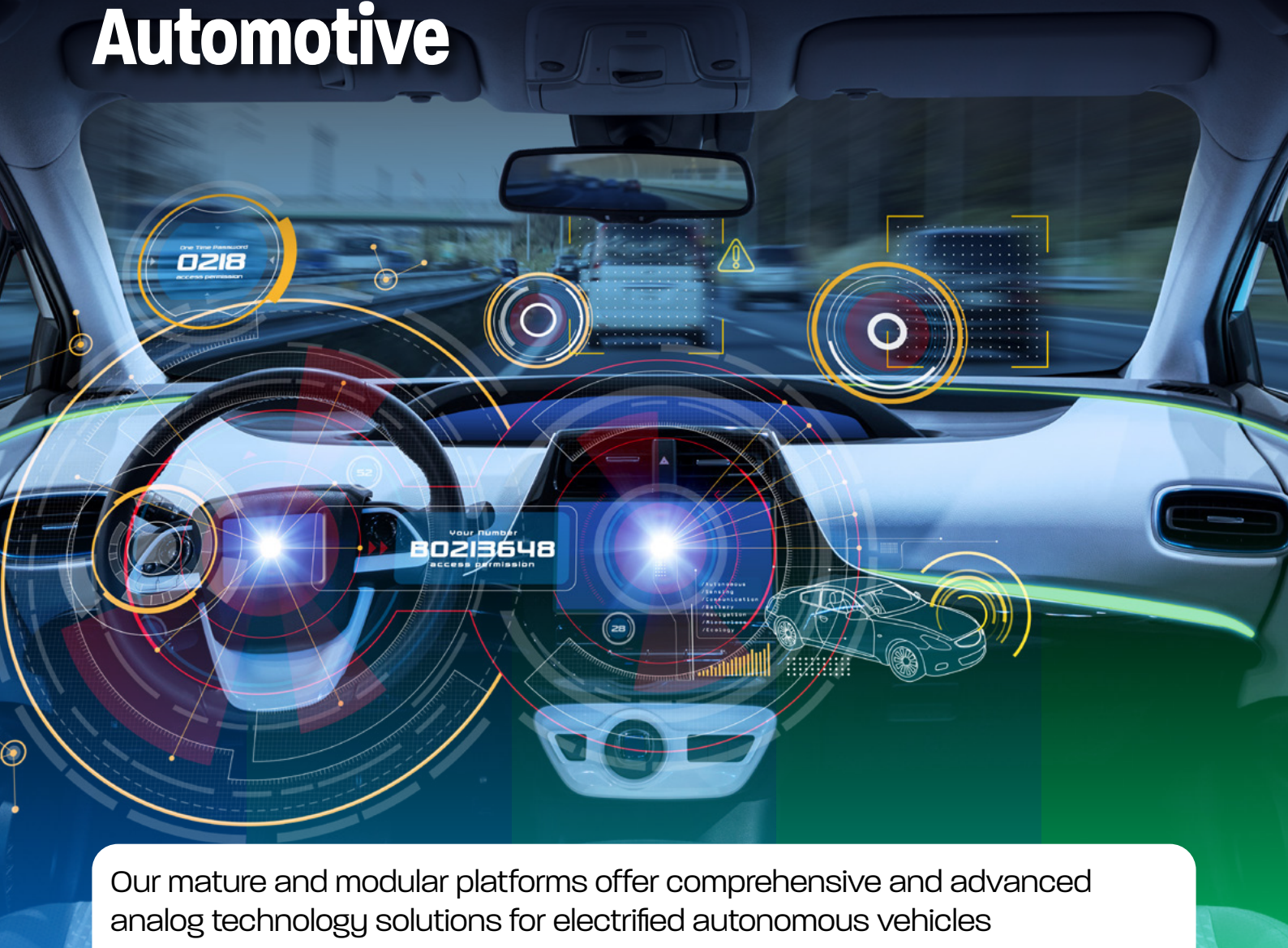
Our mature and modular platforms offer comprehensive and advanced analog technology solutions for electrified autonomous vehicles

Our technology offerings and long-term roadmap strategy are aligned with the three mega trends that are driving rapid growth in the automotive market: ubiquitous connectivity, ever-increasing vehicle autonomy and total powertrain electrification. By partnering with the market segment leaders, we develop best-in-class technologies, supporting the widest range of automotive market customers from OEMs and Tier-1 integrators to IDMs and fabless.

Our advanced **power management** platforms offer the lowest Rdson with superior voltage and current handling capability for a wide range of applications, such as motor drivers, DC-DC converters, battery management ICs, PMICs, load switches, voltage regulators, LED drivers and more.

Our **CMOS image sensor** technology offers highly advanced global shutter (GS) technology, enabling unparalleled imaging capabilities in applications that require Time-of-Flight (ToF) sensing, minimal LED flicker sensitivity, ultra-low-light sensitivity, as well as thermal imaging. The GS technology is a go-to choice for the most advanced textured light applications, such as gesture control and passenger monitoring. Our SPADs provide superior NIR imaging capability, well suited for LiDARs. In addition, our non-imaging sensor platforms provide diverse targeted sensor platforms for ambient, health and proximity monitoring.

Our **High-performance SiGe** technology is already deployed in high volume radar and is ready to enable V2X and 5G communications. Our Silicon Photonics technology is enabling innovative compact LiDARs for fully autonomous vehicles and robots. With our best-in-class **RFSOI and RFCMOS** technologies, Tower is a supplier of choice to market leaders in every high-performance RF and analog market segment.

With our leading-edge analog technologies, best-in class design enablement, flexible foundry engagement models (including custom design services through our worldwide design center and process transfer & optimization services) and strong culture of excellence in all of our IATF16949 certified facilities, we continue to expand and gain market share in different market segments by delivering comprehensive current and next-generation technological solutions for the rapidly evolving automotive world.

Worldwide Design Enablement

Our distinctive design enablement platform provides a robust design ecosystem, which together with our advanced analog technologies, promotes the highest level of collaboration driving our customers' innovative ideas into value

We offer the most accurate electronic design automation (EDA) tools and design intellectual property (IP), as well as customized design services and support through our worldwide design center.

We focus on enabling an effective and successful design cycle as well as first time working silicon so that our customers meet the advanced requirements for smart IC's in diverse markets, such as connectivity, consumer, industrial, and automotive. Through long-term collaboration with the world's major EDA, IP and design partners, we offer differentiated and application relevant design capabilities that enable fabless design teams to maximize their products' performance products while shortening the time to market.

We continue to expand our design services, tools, and support to answer the evolving market needs and provide our customers with the most advanced solutions and services, enabling successful design of next-generation ICs and driving innovation and high performance in the broadest market spread.

Aerospace and Defense

Bringing a broad range of extensive capabilities and commercially available technologies and services to the A&D community

Through our Newport Beach facility, we are partnering with a variety of companies in the Aerospace and Defense arena, holding a firm market position that continues to grow year over year. By leveraging the wide range of the Company's high-volume commercial technology portfolio, we provide the vast A&D community with advanced and sophisticated solutions, including Silicon Photonics for Optical communication, large format ROICs (readout integrated circuits) in support of numerous IR applications and systems, visible imaging, and SiGe BiCMOS devices for radar, radio, and highspeed data communications.

As an ITAR certified facility with trusted foundry access, we also support various critical US government projects and needs. We are the number one foundry of choice for ROICs, hold a leading position in SiGe, and are rapidly expanding new foundry capabilities in Silicon Photonics (SiPho) in the DoD fabrication space.

Aimed to best serve our customer's needs and development processes, our platform-rich features include:

- Industry leading Silicon Photonics technologies enabling exciting new advancements in the Optical Communications, sensing and emerging maketarenas.

- 180nm, 130nm and 65nm ROIC & CIS with stitching supporting ITAR protocol.

- Technical teams and program management specifically dedicated to the A&D customer base.

- World class design enablement environment leveraging Tower Semiconductor's commercial offerings to enable an efficient and accurate design process and first-time silicon success.

Enhancing our leading foundry position and ensuring our continuous support of the A&D community, we are engaged in various strategic and specialized activities addressing market-specific applications such as: radio and millimeter-wave communications, satellite, radar, high speed data transmissions, multiple infrared and visible imager applications, various sensors, custom analog circuits (including DACs, ADCs, LNAs and switches), as well as optical data and sensing applications meeting the requirements of the broad Military/Governmental customer base.

Research and Development
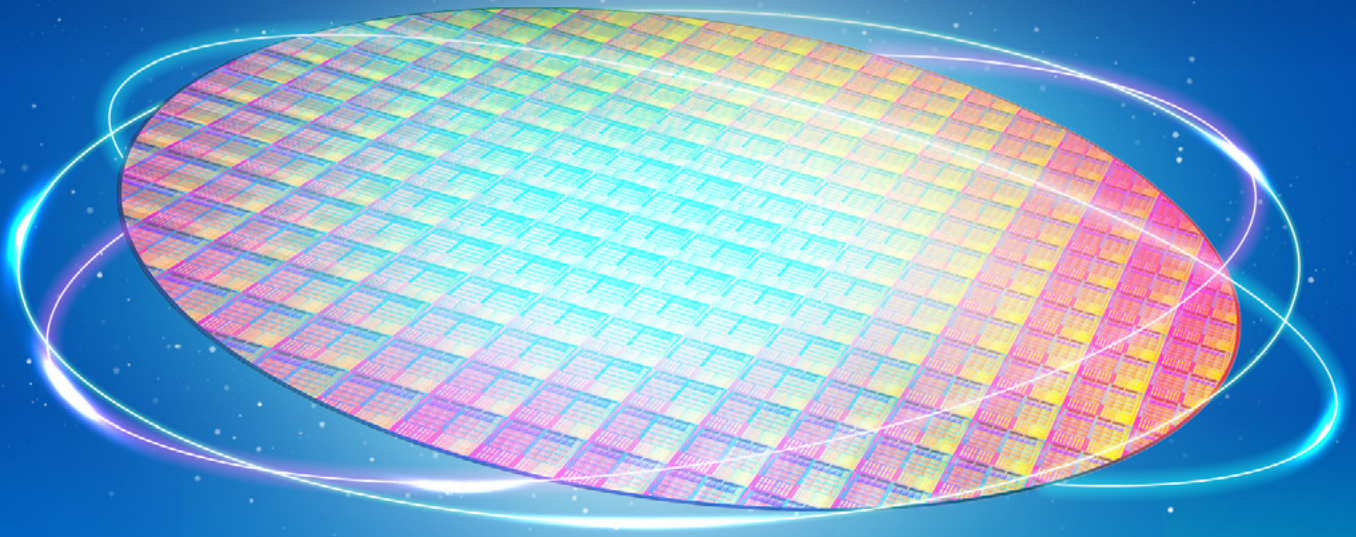
Promoting a global environment of innovation and progress, Tower Semiconductor is continuously developing advanced production platforms comprising breakthrough solutions for diverse existing and emerging analog electronics markets, such as consumer electronics, industrial, wireless communications, optical communications and photonics, automotive, medical, and aerospace and defense. The Company's recent research activities address the emerging fields of advanced driver assistance systems for automotive (ADAS), high-frequency devices to enable various communications and mobile applications, RF switches, smart power management, novel silicon photonics systems, smart CMOS image sensors, non-imaging sensors, quantum computing, and artificial intelligence for data processing. These devices and technologies being developed are targeting our initiatives in emerging markets such as 5G and 6G, data center network traffic at 100G, 400G, 800G and beyond, smart power and battery control, industrial and commercial sensors, and aerospace & defense.

New technological platforms, achievements, and novel devices

Tower Semiconductor is continuously engaged in numerous R&D activities based on original patented ideas of its engineers, close collaboration with its customers, and partnerships with leading research centers worldwide. These activities target new production platforms and specialized solutions for its customers to meet the emerging demands and product roadmaps of the industry.

Ongoing Innovation Partnerships Tower takes an ongoing part in numerous prestigious consortiums and collaborations with world-leading academic institutions in the US, Europe, and Israel and Japan.

Patents

Every year, the Company files and is granted a number of patents. These patents span the breadth of Tower technology across all its business units and demonstrate paths towards current and new technological frontiers.

Talks and Publications

Tower Semiconductor engineering experts serve as members of technical/scientific committees and reviewers of leading international journals and scientific conferences, such as IEEE IMW, Electronics, IEEE ED. In addition, every year numerous scientific papers by Company engineers are published in various journals as well as invited talks presented in leading technological forums, panels, and conferences worldwide.

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