

DIODES

INCORPORATED



Analog | Discrete Logic | Mixed-Signal

Delivering High-Quality Semiconductor Products to the World's Leading Companies

[diodes.com](https://www.diodes.com)

Products to meet your design needs...

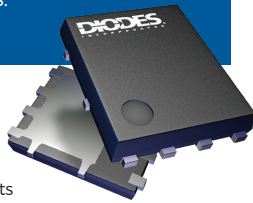
...Across a wide range of existing & emerging applications

OVERVIEW

Diodes Incorporated (Diodes) is a leading global designer and manufacturer of discrete, analog, mixed-signal, and logic semiconductors.

We enable innovation by leveraging our broad product portfolio, company-owned operations, and leading-edge packaging technology to meet your needs.

Our broad range of application-specific solutions, coupled with a worldwide network of engineering, testing, manufacturing, and customer service sites, positions us as a premier provider for high-volume, high-growth markets.

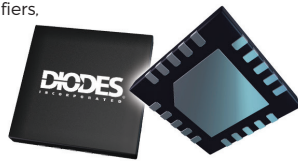


DISCRETE

Diodes discrete semiconductor portfolio is where innovation meets reliability. Our products go beyond industry standards, incorporating patented and proprietary technologies that set new benchmarks in performance. With forefront package designs, we prioritize increasing power density, enhancing power efficiency, and minimizing design space. We bring a unique edge to the market, not just meeting but exceeding expectations by constantly pushing boundaries. Our commitment to providing alternative products enhances market competitiveness, ensuring you have versatile solutions for your diverse needs. We provide the key elements for your successful and groundbreaking designs.

AMPLIFIERS & SENSORS

Our amplifier portfolio includes audio amplifiers, precision op amps and high-side current monitors, and comparators. Our expanded sensor portfolio includes Hall switches and linear sensors and contact image sensors.

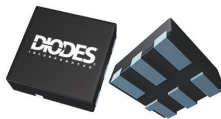


POWER MANAGEMENT

Our power management portfolio includes AC-DC and DC-DC Converters /LED Drivers that incorporate leading-edge topologies to meet the markets' efficiency and standby power requirements. Our LDO, Gate Driver, and Power Switch families provide low-loss, high-power-density solutions. In addition, we have a growing USB Type-C® control and charge portfolio.

CONNECTIVITY & TIMING

Diodes is a leading designer and manufacturer of essential solutions for the timing, switching, bridging, and conditioning of high-speed signals required by today's ever-increasing speed and bandwidth-demanding applications. Our serial connectivity solutions cover a broad range of protocols and interfaces including PCIe®, SATA, SAS, HDMI™, DisplayPort™, USB, USB Type-C, Thunderbolt™, and Ethernet. Diodes provides a full-timing portfolio including crystals and crystal oscillators as well as clock ICs covering kHz to GHz with jitter in the low femtoseconds.



LOGIC & VOLTAGE TRANSLATION

Our logic and voltage translation portfolio covers single- and dual-gate logic, standard logic gates, voltage translators, and interface logic (analog switches, registers, buffers, transceivers, and line drivers) offering the right operating voltages and driving capabilities for today's applications.

MARKETS

As part of its global footprint, Diodes is focused on these high-growth, high-volume markets:

AUTOMOTIVE

Diodes offers a wide portfolio of automotive-compliant products targeted at high-growth, high-reliability applications, such as Connected Driving (merging of ADAS, Telematics, and Infotainment), Comfort, Style and Safety (including lighting and motor control), and Powertrain (covering conventional, hybrid, and electric vehicles).

Our automotive-compliant products are qualified to automotive standards AEC-Q100/Q101/104/200 and are manufactured in facilities that are certified to IATF 16949/VDA6.3 manufacturing routes. These products are fully supported by Production Part Approval Process (PPAP) documentation and are specific-change controlled.

COMMUNICATIONS

Diodes offers highly effective products to enhance solutions in areas such as telecom infrastructures, enterprise networks, wireless networks, and connected devices. A broad portfolio of MOSFETs, rectifiers, protection devices, high-speed signal switches and multiplexers, ultra-low jitter XOs, clock generators, and clock buffers provides for highly efficient and cost-effective solutions to be developed.



COMPUTING

By addressing the key requirements of the computing industry—speed, power efficiency, cost effectiveness, and reliability—Diodes broad portfolio of products are used in all computing areas, such as notebooks, motherboards, printers, AI servers, data centers, cloud computing, storage, and adapters. Diodes also provides leading-edge solutions for USB Type-C connectivity.



CONSUMER

Cost-effective solutions and a high-volume logistic capability position Diodes to effectively deliver discrete, analog, mixed-signal, and logic solutions to this fast-growing market sector. Our portfolio of products are in everyday consumer applications such as IoT, wearables, home automation and smart infrastructure.



INDUSTRIAL

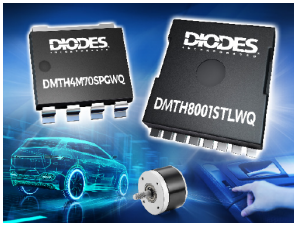
Our extensive portfolio of bipolar and MOSFET transistors, diodes, sensors, standard analog, and power management ICs ensure reliable and effective power management in potentially harsh industrial environments.

For embedded applications, Diodes offers a wide variety of products, including specialized timing products like processor-specific XO, clocks, and PCIe and USB solutions.



Discrete

MOSFETs



- N- and P-channel, from small-signal to power MOSFETs
- 8V to 600V in single, dual, complementary, and H-bridge (quad) configurations
- Packages from the tiny DFN0604 to the PowerDI1012 and PowerDI8080
- Shielded-gate trench, and lateral (LD-MOS) technologies
- Smart load switches
- Automotive-compliant variants available

SiC MOSFETs



- N- channel power MOSFETs
- 1200V rating
- Low on-resistance $R_{DS(ON)}$ and Q_g
- Low $R_{\theta JC}$ high thermal efficiency
- TO247-4 package with Kelvin pin for optimized high frequency performance
- Fast and robust body diode with low reverse recovery (Q_{RR})
- Automotive-compliant variants available

SiC Schottky Barrier Diodes



- Wide bandgap, low loss
- Ratings: V_{RRM} up to 1200V and I_O up to 10A
- High-switching speeds
- High-temperature (175°C) operation
- Soft-switching behavior reduces EMI
- Forward voltage positive temperature coefficient
- High surge current capability

Diodes and Rectifiers



- Switching diodes—single, dual, triple, quad
- Zener diodes—tolerances as tight as to $\pm 2.0\%$
- Low leakage diodes— $I_R < 5nA$
- Schottky diodes—single, dual, and quad
- Standard, fast, and ultra-fast recovery rectifiers
- Automotive-compliant variants available

Bridge Rectifier



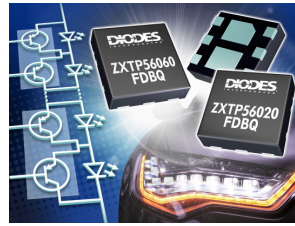
- SMD TT series V_{RRM} up to 1000V I_O up to 10A
- Through-hole GBJ/GBU series V_{RRM} up to 1000V I_O up to 50A
- Low forward voltage (V_F) for high efficiency @ $T_J=150^\circ C$
- GBJs with ceramic heatsink technology $R_{thjc} = 0.45^\circ C/W$
- Fast filter bridge to reduce EMI noise
- High-performance Schottky

Protection Devices



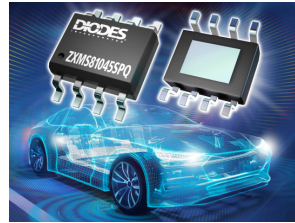
- TVS for ESD protection up to 30kV on datalines including USB, HDMI, DVI, Thunderbolt, MIPI, and Ethernet
- Low-capacitance TVS down to 0.15pF for high-speed data rates
- General-purpose Zener TVS from 18W to 6.6kW
- Surge protection devices up to 200A
- Automotive-compliant variants available

Bipolar Transistors



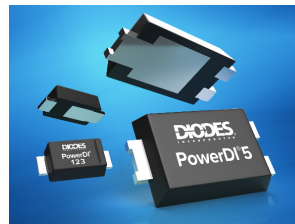
- Technology leadership up to 900V
- Very low $V_{CE(SAT)}$ for either higher current handling or reduced temperature operation
- Excellent gain hold at high peak currents for improved driving of Si/SiC MOSFETs or IGBTs
- NPN, PNP, single, dual, complementary, matched, pre-bias, darlington, and special function transistors
- Wide selection of package options to cover most application requirements
- Automotive-compliant variants available

IntelliFET® Self-Protected MOSFET



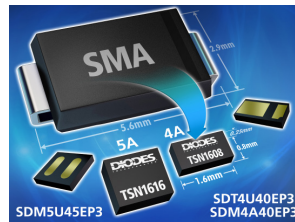
- High-side and low-side power switch options
- Single and dual configurations
- Comprehensive self-protection and safeguards for the connected load
- Auto restart
- Diagnostic output
- Logic-level input
- Automotive-compliant variants available

SBR® (Super Barrier Rectifier)



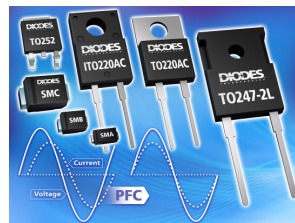
- Industry-leading rectifier technology
- Ultra-low forward voltage (V_F) for high efficiency
- Reduced high temperature reverse leakage current (I_R)
- Immunity to thermal runaway
- Ratings: V_{RRM} up to 400V and I_O up to 60A
- I_R of M series in nano scale
- Superior avalanche capability
- Automotive-compliant variants available

Schottky Rectifiers



- The industry's smallest in class trench Schottky rectifiers offer highest current density
- Low thermal resistance
- Ratings: V_{RRM} up to 200V and I_O up to 60A
- Superior avalanche capability
- Environmentally friendly CSP packaged devices are fully RoHS 3.0 compliant with no exemptions
- Automotive-compliant variants available

FRR (Fast Recovery Rectifiers)



- Rectifiers optimized for PFC raise system efficiency in popular boost converter configurations
- Reduced losses through Low V_F and Fast Recovery
- High forward surge current (IFSM)
- Ratings: V_{RRM} up to 1000V and I_O up to 30A
- Soft recovery behavior reducing EMI
- Ultra-low leakage current
- Low thermal resistance

Thyristor



- Triac, SCR, SIDAC, Thyristor Surge Protection Device
- $I_{CT(ON)}$ 5 to 50mA, $I_{T(ON)}$ 0.5 to 25A
- V_{RRM} up to 800V, T_J up to 150°C
- Multiple packages include TO92, SMA and TO220
- Sensitive gate trigger
- Low thermal resistance
- High heat dissipation

Analog, Mixed Signal and Logic

AMPLIFIERS

Operational Amplifiers and Comparators



- Precision RRIO CMOS op-amps ASx333/Q and AS2376/Q
- Industry-standard, general-purpose op-amps and comparators: AS3xx/LM290x series
- Industry-standard, low-voltage, general-purpose op-amps and comparators: LMV3, AZV8, and AZV3 series
- Single, dual, and quad configurations
- Automotive-compliant variants available

Audio Amplifiers



- Output powers from 1.5W to 30W/channel
- Low-EMI filterless design, anti-saturation, and power-limit features improve audio quality with lower solution cost
- Booster converter integrated for dynamic/piezo/ceramic speaker load in wireless speakers, IoT, and security or mobile apps
- High-quality headphone amplifier for headsets, gaming, or TV/monitor apps
- Automotive-compliant variants available

Current Monitors



- Simple high-side current measurement without upsetting 0V reference point
- ZXC199/21x precision bidirectional current monitors – automotive compliant available
- ZXC108x high-side current monitors with operation up to 60V
- Simple SOT23 micropower current monitors
- ZXCxxxQ automotive-compliant high-side current monitors available

POWER MANAGEMENT

DC-DC Switching Regulators



- Buck, buck-boost, and boost devices
- Wide voltage input range up to 60V
- Low quiescent current and high efficiency at light load
- Low EMI design
- High power-density and small footprint solutions
- Easy to use with less external component count and simple PCB layout
- Automotive compliant buck converters covering whole automotive battery range

LED Lighting and IoT Power Solutions



- Automotive-compliant LED drivers available
- Innovative, reliable, low standby, and cost-effective connected lighting and IoT power solutions
- High-performance DC-DC and linear LED drivers for industrial and commercial LED lighting applications
- 0.5% channel-to-channel matching, multiple channel LCD backlight LED drivers
- Small footprint, low thermal, and high power-density packages

Linear and Low Dropout Voltage Regulators



- Ultra-low I_q, low-dropout, and ultra-small footprint
- High PSRR
- Wide input voltage families with fixed output voltages
- Tight tolerance across wide temperature ranges
- Industry-standard 78 and 78L families
- Automotive-compliant variants available

Power Switches



- USB Type-A/B/C/PD and HDMI port overcurrent protection
- High-side power supply load switches for 0.6 to 20V rails
- Reverse-current, overcurrent, overvoltage, overtemperature, and surge protection
- Ideal-Diode Controllers
- UL recognized and IEC 60950-1 CB scheme certified
- Automotive-compliant variants available

AC-DC Products for Offline and IOT Power Supplies



- High-efficiency isolated PWM controllers
- Low standby power primary side regulation (PSR) controllers and switchers
- High-voltage non-isolated buck converters
- Secondary side synchronous rectifiers
- Secondary side CC-CV opto-coupler drivers for voltage regulation and overcurrent protection

Gate Drivers



- Wide portfolio of gate drivers rated up to 600V
- Three-phase, half-bridge, high-side/low-side gate drivers for driving N-MOSFETs or IGBTs
- Inverting and non-inverting, dual, or single low-side drivers
- Automotive-compliant variants available

USB Charging



- USB-PD 3.1 standard (SPR) and extended (EPR) power range
- Automotive-compliant dual-port USB PD3.1 SPR controller available
- USB-PD 3.1 SPR and EPR Sink controllers
- USB-C DFP charger
- USB-A DCP charger plus power switch

Voltage References and Supervisors



- LM4040/1 equivalent shunt references
 - 1.2V, 2.5V, 3.0V, 3.3V, 4.096V, and 5V
 - Extra-low knee current shunt references
- 2.5V, 1.24V TLV431 equivalent shunt regulators
 - Extra-low knee current AP4315
- Automotive-compliant variants available
- 0.6V Shunt regulators
- Microprocessor supervisors/reset generators

CONNECTIVITY

Switches/Multiplexers



- Data rates up to 32Gbps
- High-speed signal multiplexer switches (USB, PCIe, USB Type-C, 10GE, HDMI, DP, MIPI, SAS, SATA, ThunderBolt)
- High-speed crossbar switches
- LVDS receivers/transceivers
- Audio switches, bus switches, VGA switches
- Automotive-compliant variants available

PCIe Packet Switches/Bridges



- PCIe 3.0 packet switches
- PCIe-PCI/PClX bridges
- PCIe, PCI, I2C/ SPI, 8-bit to UART
- PCIe to USB/PCIe
- Automotive-compliant PCIe 3.0 packet switches available

Signal Integrity (ReDrivers/Retimers/Active Switches)



- PCIe 5.0 ReDrivers™
- 10Gbps ethernet (10GE) ReDrivers
- USB4/3.2 ReDrivers
- SATA 3.0 ReDrivers
- SAS 3.0 combo ReDrivers
- HDMI 2.1/DisplayPort 2.1 ReDrivers
- USB Type-C and DP-ALT 4.4/6.4 10Gbps ReDrivers
- Automotive-compliant ReDrivers available

Interface



- UARTs
- LVDS drivers/receivers
- I²C IO expander
- I²C Multiplexers/switches
- Automotive-compliant IO expanders available

TIMING

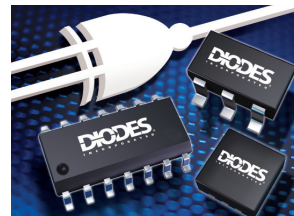
Clock IC



- Clock Generators with phase jitter as low as 40fs
- Clock Buffers with additive jitter as low as 10fs
- PCIe 5.0 / 6.0 clock generators and buffers
- Automotive-compliant variants available

LOGIC AND VOLTAGE TRANSLATION

General Logic and Voltage Translation



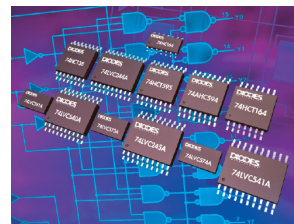
- Single-gate, dual-gate, and standard logic.
- Eight technology families: LV, LVC/E, AHC/T, AUP, HC/T
- DFN0808 - QFN4525, SOT25 - SOT553, SO and TSSOP
- Multi-channel, auto-direction level shifter with open-drain and push-pull interface
- Automotive-compliant variants available

Crystals and Crystal Oscillators



- Crystals
- Crystal oscillators (XO, TCXO) with different output logic types
- Ultra-low jitter XO with RMS jitter as low as 50fs
- PCIe 5.0 / 6.0 HCSSL and LP-HCSSL XO available
- Automotive-compliant variants available

Interface Logic



- Analog switches
- Shift registers and multiplexers
- Buffers, transceivers, and line drivers
- Automotive-compliant variants available

SENSORS

Contact Image Sensor (CIS)



- Used for a variety of image sensor applications such as: surface inspection systems, banknote validators, scanners, and high-speed copiers
- Scan speeds up to 50MHz
- Scan resolution up to 4800dpi
- Depth of Field (DOF) from +/-0.3 to +/-1.7mm
- Various optical light source configurations, RGB, IR, UV, and white LEDs

Hall Effect Sensors



- Omnipolar, unipolar, latch, and linear Hall sensor products
- Wide input voltage range from 1.1V_{IN} to 28V_{IN}
- Micropower, ultra-low noise, and ultra-low switch point drift
- Two-wire ISO 26262-ready AH32xxQ latches and unipolar Hall switches with self-diagnostics
- ISO 26262-ready AH39xxQ dual latch with speed and direction outputs with built-in self-diagnostics
- Automotive-compliant variants available



Diodes discrete, analog, mixed-signal, and logic products provide our customers with leading-edge solutions for next-generation systems.

Discrete products include bipolar transistors, MOSFETs (inc. smart and SiC), diodes and rectifiers (inc. SiC, SBR, Schottky, SCR, and triacs), bridge rectifiers, protection products, and functional arrays.

Analog and mixed-signal products cover these main areas: power management ICs (inc. LED drivers), amplifiers, sensors, signal switching, signal integrity, connectivity, and timing products.

Logic products includes single-gate, dual-gate, and standard logic gates as well as voltage translators, analog switches, registers, and multiplexers.

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