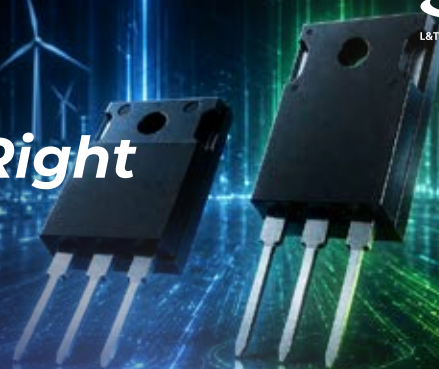


MOSFET vs IGBT

Which Power Device is Right for Your Next Design?



When designing a power converter, one of the earliest and most critical decisions is selecting the right power switch. Two technologies dominate this space **MOSFETs and IGBTs**.

Although both are designed to switch electrical current efficiently, their strengths differ significantly depending on voltage, switching frequency, efficiency targets, and application requirements.

Understanding these differences can help engineers optimize performance, reduce losses, and improve system reliability.

Understanding the Basics

A **MOSFET (Metal Oxide Semiconductor Field Effect Transistor)** is a voltage-controlled device known for its fast-switching speed and excellent efficiency in low- to medium-voltage applications.

An **IGBT (Insulated Gate Bipolar Transistor)** combines the easy gate drive characteristics of a MOSFET with the high-current capability of a bipolar transistor, making it ideal for medium- and high-power systems.

MOSFET vs IGBT: A Quick Comparison

Feature	MOSFET	IGBT
Best Operating Voltage	Low to Medium	Medium to High
Switching Speed	Very High	Moderate
Conduction Loss	Very Low at lower voltages	Optimized for higher voltages
Frequency	High-frequency applications	Medium-frequency applications
Typical Applications	SMPS, DC-DC converters, battery systems	Motor drives, industrial inverters, renewable energy

When Should You Choose a MOSFET?

MOSFETs excel in applications requiring:

- » High switching frequencies
- » Low switching losses
- » Enabling compact and lightweight power supplies
- » Fast transient response



Typical applications include:



DC-DC converters



Switch Mode Power Supplies (SMPS)



Battery Management Systems (BMS)



Telecom power systems

Their rapid switching capability also enables smaller passive components, resulting in more compact system designs.

When Does an IGBT Make More Sense?

As system voltage and current increase, IGBTs become the preferred choice.

They offer:

- » Excellent performance in high-voltage environments
- » High current-handling capability
- » Robust operation in industrial applications
- » Improved efficiency in medium-frequency power conversion



Typical applications include:



Industrial Motor Drives



HVAC Systems



Renewable Energy Inverters



Robotics



UPS Systems



EV Charging Infrastructure

LTSC's IGBT portfolio is designed with advanced technologies that provide soft switching behaviour, low conduction losses, reduced gate drive losses, and high short-circuit capability for demanding industrial environments.

Delivering high quality & reliable semiconductor solutions

Why the Right Device Matters

Selecting an inappropriate switching device can lead to:

Increased power losses

Higher thermal stress

Larger cooling requirements

Reduced system

Increased total cost of

The right semiconductor enables engineers to maximize efficiency while maintaining reliability throughout the product lifecycle.

LTSCCT's Portfolio

LTSCCT offers a comprehensive range of Silicon Carbide (SiC) MOSFETs and IGBTs designed for industrial, automotive, and renewable energy applications.

The portfolio includes:

- » **IGBT & SiC:** High power modules in single-switch and half-bridge configuration
- » **IGBT & SiC:** 6-in-1 Power Integrated Module (PIM)
- » **SiC:** THD and SMD discrete packages
- » Multiple voltage and current options
- » Advanced packaging for improved thermal performance

These devices are engineered to simplify power system design while delivering reliable performance across a wide range of operating conditions.

Conclusion

There is no universal winner between MOSFETs and IGBTs. The ideal choice depends on your application's voltage, current, switching frequency, thermal constraints, and efficiency goals.

By understanding where each technology performs best, engineers can build systems that are more efficient, reliable, and future-ready.

Whether you're designing a compact power supply or a high-power industrial drive, selecting the right switching device is the first step toward better performance.

Let's Power the Future Together

L&T Semiconductor Technologies partners with customers worldwide to deliver reliable, efficient, and scalable semiconductor solutions for the next generation of industrial and energy applications.

Whether you're developing intelligent motor drives, renewable energy systems, industrial automation equipment, or next-generation power conversion platforms, LTSCCT Power Modules help you achieve greater efficiency, reliability, and performance.

Our Global Footprint

INDIA

S2 Building, 10th Floor, L&T Tech Park, Bellary Road, Next to Raintree Boulevard, Park View Layout, Byatarayanapura, Bengaluru 560092

TOWER-EXPRESS TRADE, Plot 15&16, Film City, Sector 16A, Noida, 201301

UNITED STATES

8701 Bee Caves Road, Suite 230, Austin, TX 78746

EUROPE

3rd Floor, Hopfenstraße 6, 80335 München, Germany

JAPAN

7F, Shinagawa East One Tower, 2-16-1 Konan, Minato-ku, Tokyo 108-0075

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