



IceMOS Technology

Empowering Clean Energy
from Renewable Generation to Grid Storage
Product & Technology Brochure



Next Generation Power for Solar and Wind Energy Applications

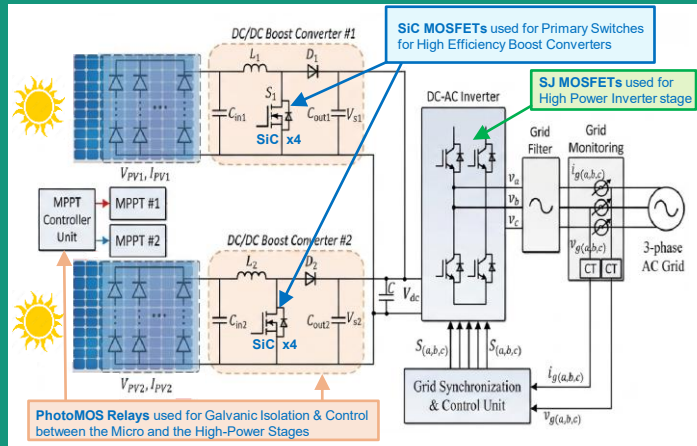
The transition to decentralized renewable energy generation, anchored by gigawatt-scale solar arrays, offshore wind farms, and robust smart grids, demands breakthrough performance in power conversion and electrical isolation.

IceMOS delivers a high-performance portfolio of Super Junction (SJ) MOSFETs, Wide-Bandgap SiC MOSFETs, and Trench Silicon-on-Insulator (TSOI) engineered substrates for PhotoMOS relays. Together, these technologies minimize conversion losses, withstand harsh environmental extremes, and guarantee fail-safe galvanic isolation across renewable energy networks.

Utility-Scale Solar Photovoltaic (PV) Inverters

Power MOSFETs are used in many Solar PV applications, examples; String inverters, central inverters, and multi-megawatt photovoltaic power conditioning units (PCUs). The attached diagram is of a Solar PV grid-connected System circuit diagram. The role of each DC/DC boost converter is to step up the voltage level produced by the corresponding PV panel and insure the Maximum Power Point Tracking

SJ MOSFETs are utilized widely across auxiliary housekeeping power supplies, internal cooling controls, and low-voltage communication sub-assemblies to ensure a reliable and always-on system management.

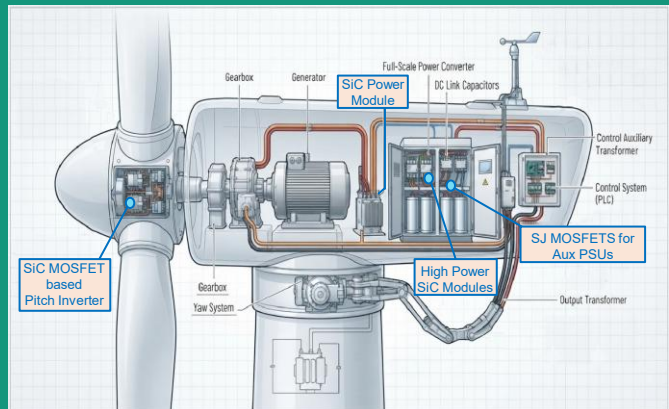


SiC MOSFETs are deployed in Maximum Power Point Tracking (MPPT) boost stages and high-voltage DC-AC inverter blocks. Their ultra-low on-resistance ($R_{ds(on)}$) at elevated temperatures and minimal tail current allow systems to switch at significantly higher frequencies—maximizing energy harvest under fluctuating sunlight conditions while drastically shrinking passive components.

Wind Power Conversion Systems

Power MOSFETs are used in many Wind turbine or Grid connection applications, examples; Full-converter wind turbines and heavy-duty back-to-back AC-DC-AC frequency converters.

SiC and **SJ MOSFETs** can operate in harsh, demanding environments where extreme thermal stability, high voltage-blocking capabilities, and superior resilience against severe grid transients are vital. These devices ensure high reliability and extended operational lifespans for remote, low-maintenance onshore and offshore installations.



Architectural Differences in Wind & Solar Power Stages

Hard-Switching vs. Body Diode Stress: Wind back-to-back converters and bidirectional solar storage systems frequently stress the device's body diode during third-quadrant operations. SiC MOSFETs feature an intrinsically robust body diode with virtually negligible Q_{rr} , handling hard-switching seamlessly. In contrast, standard SJ MOSFETs experience higher reverse recovery losses unless paired with external fast-recovery diodes or implemented in soft-switched topologies.

System-Level Footprint: While SJ MOSFETs excel in mid-tier, budget-sensitive residential units under 900V, SiC MOSFETs allow designers to scale grid-tied string and utility inverters up to 1500V+ architectures, drastically reducing the physical volume of filters, heatsinks, and transformers.

Grid Stability, Transmission, and Smart Distribution

To architect the future of energy, modern grid systems must manage power seamlessly from the substation to storage by:

- **Protecting Distribution:** Ensuring safe, uninterrupted electricity flow through smart grids and HV substations.
- **Connecting Generation to Storage:** Unifying volatile green energy sources with robust battery storage networks.
- **Driving Rapid Response:** Facilitating immediate load management, peak shaving, and rapid EV charging demands.

Renewable Green Energy to Storage BESS & EVs

There are numerous roles for SJ & SiC MOSFETs in this segment that ensure seamless switching capability during peak shaving, load leveling, and rapid EV charging spikes. Some of the applications areas that use these MOSFETs are Bidirectional power transfer units connecting intermittent solar/wind yields directly into grid-scale Battery Energy Storage Systems (BESS) and fast-charging hubs.

Utility Substations & Smart Grid Protection

PhotoMOS solid-state relays (SSR's) provide crucial electrical and galvanic isolation (up to 1500V+) between high-voltage power circuits and low-voltage sensitive control systems using optical signals, eliminating contact bounce and signal noise. Because they lack moving parts, PhotoMOS devices offer superior reliability, zero mechanical wear, and a much longer operational life than traditional mechanical relays. Their fast-switching speeds also deliver quicker response times for safety-critical functions like disconnecting battery packs during fault conditions.

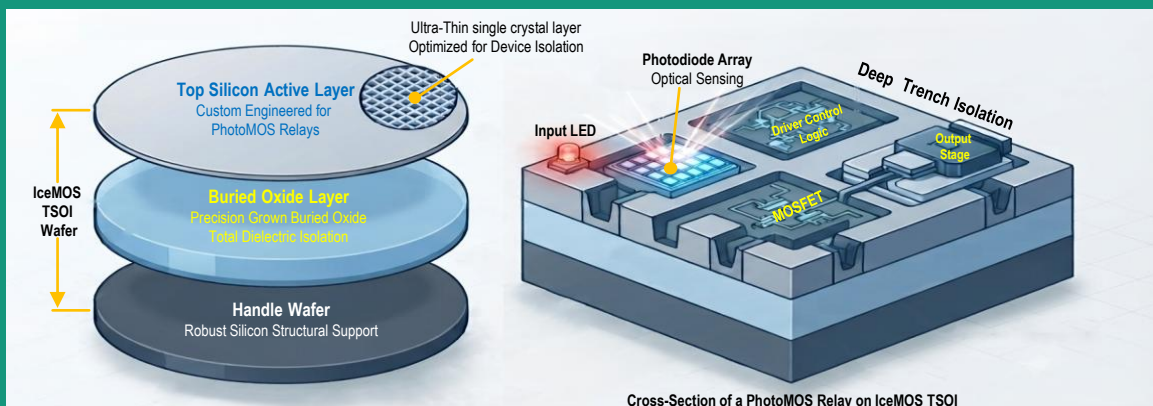
Typical applications that use these SSR's are Flexible AC Transmission Systems (FACTS), solid-state circuit breakers (SSCBs), and automated telemetry Remote Terminal Units (RTUs).

IceMOS TSOI Technology: The Foundation for Reliable Sensing & Control

Leveraging decades of expertise in wafer bonding, IceMOS manufactures high-performance Trench Silicon-on-Insulator (TSOI) wafers. With millions of SOI wafers successfully shipped to the worldwide market, we provide the vital foundation required for ultra-reliable semiconductor relays. These components are critical for safeguarding solar monitoring systems, wind turbine control units, and smart grid substations.

Role of TSOI-based PhotoMOS Relays:

- **Total Electrical Isolation:** The oxide layer isolates active components completely, effectively eliminating parasitic leakage currents.
- **Ultra-Fast, Noiseless Switching:** Significantly reduces parasitic capacitances to allow PhotoMOS relays to achieve rapid, noiseless signal switching alongside absolute galvanic isolation.
- **Exceptional Reliability & Longevity:** By actively preventing cross-talk and thermal degradation at the silicon level, IceMOS technology ensures stable, bounce-free, high-voltage operation over millions of cycles. Backed by our advanced defect detection and inspection technologies, every wafer is manufactured to the highest quality standards. This ensures reliable, high-yield device performance.



Portfolio Snapshot: SJ & SiC MOSFETs for Green Energy Applications

Family	Product	VDS (V)	ID @ 25°C (A)	RDS(ON) typ (Ω) at VGS=10V	Qg (10V) (nC)	Coss (pF)	Qgd (nC)	Qrr (μC)	Package
Super Junction (SJ)	ICE47N60W	600	47	0.06	189	260	65	12	W
	ICEK49NF60T	600	49.1	0.045	117	78	64	1	T
	ICEK55NF60T	600	55.1	0.0355	136	90	71	0.8	T
	ICEK72NF60W	600	72	0.026	134	115	72	0.9	W
	ICEK11NF65D	650	10.5	0.26	22	20	12	0.29	D
	ICEK15NF65	650	15.1	0.165	32	24	17	0.6	TO
	ICE11N70	700	11	0.18	81	106	29	7	TO
	ICE15N73W	730	15	0.18	75	106	25	7	W
Silicon Carbide (SiC)	ICE26M75T	750	65	0.026	49	117	10.7	0.134	T
	ICE10M75W4	750	162	0.0094	223	420	32	0.5	W4L
	ICE380M80D	800	9.6	0.38	9	21	5.6	0.0163	D
	ICE260M80D	800	12.2	0.26	12.5	28	8	0.0213	D
	ICE31M120W4	1200	57	0.0304	63	96	21	0.217	W4L
	ICE27M120W4	1200	74.2	0.027	176	130	62	0.293	W4L
	ICE128M150W4	1500	19	0.128	24	27	8.3	0.186	W4L
	ICE31M150W4	1500	54.9	0.031	40	78	14	0.267	W4L

Package Codes: TO=TO220, FP=Full Pak, W4L=TO247-4L, W=TO247, D=TO252, DPAK, L=DFN88, LK=DFN56, B=TO263, T=TOLL
Samples available upon request

IceMOS MOSFETs & Advanced Engineering Substrates

MOSFETs: IceMOS is a global innovator in Power Electronics. We design and manufacture high-voltage MOSFETs, providing energy-efficient solutions for the industrial, medical, automotive, and telecommunications sectors. We are dedicated to shaping a limitless, sustainable future.

Advanced Engineering Substrates: IceMOS Technology is a global semiconductor leader operating a proprietary fabrication facility in Belfast, Ireland. We deliver advanced Engineering Substrates that drive millions of smart, connected applications, transforming the way people work and live. Our substrates enhance speed, efficiency, and reliability across microelectronics, power devices, MEMS sensors, and photonics.

Patents : IceMOS owns intellectual property with 70+ granted and 15+ pending patents, powering our core technologies and process licenses, based on this IP.

Regulatory Compliance: Our products are RoHS and REACH compliant. We maintain a conflict-free supply chain and do not use minerals sourced from conflict zones.

IceMOS Worldwide Locations

MOSFET Sales:

USA & ROW: americasales@icemostech.com
Euro: europesales@icemostech.com
China: chinasales@icemostech.com
Japan: fumikakuramae@icemostech.com

IceMOS Technology Ltd,
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Belfast, BT17 0LT
Northern Ireland

<https://www.icemostech.com>

Engineered Substrate Sales:

Euro and Asia: ramizakaria@icemostech.com
USA and ROW: hughgriffin@icemostech.com

Scan to access
the High Voltage
Power MOSFETs
(Blue) Brochure
and SJ & SiC
Selection Table

