

## Product brief

# R9 rad hard MOSFET technology

Higher performance & efficiencies with low risk design reuse

International Rectifier HiRel (IR HiRel)'s new R9 superjunction technology platform offers notable size, weight and power improvements over prior rad hard MOSFET generations, delivering superior performance and efficiencies with a well-known silicon gate drive setup. A simple drop-in, R9 enables a high degree of design reuse, yielding immediate efficiency improvements in your proven circuitry. R9 is a low risk upgrade path to higher performing space-grade power systems, with assured confidence in overall system reliability.

In systems such as high-throughput satellites, using R9-based rad hard MOSFETs enables simpler circuit topologies and can significantly reduce cost-per-bit ratio and overall system cost. Our full ecosystem of N- and P-channel R9 MOSFETs delivers a range of options for high-reliability applications such as:

- > Space-grade DC-DC converters
- > Intermediate bus converters
- > Motor controllers
- > Other high-speed switching designs
- > High-side, low frequency load switching
- > Overload protection switching
- > Circuits requiring linear mode operation

### Rugged, reliable performance you can count on

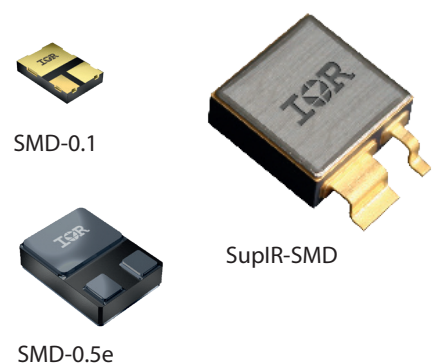
IR HiRel's R9 MOSFET technology supports wide gate-source voltage variation ( $\pm 20V$ ), making the portfolio far less sensitive to circuit parasitics than alternatives. Especially for high frequency applications, designers must balance between higher switching frequency, design and verification time to optimal board layout and reliability. R9-based rad hard MOSFETs are also highly ruggedized, designed to absorb avalanche energy for momentary drain-source voltage overshoot. Combined with superior SOA, transient thermal impedance and high ESD ratings, our R9-based MOSFET portfolio is a low risk path to improved reliability and performance.

### Key features

- >  $V_{GS}$  rating of  $\pm 20V$
- > Avalanche capability
- > Enhanced Safe Operating Area (SOA)
- > Largest portfolio of N- and P-channel power MOSFETs

### Customer benefits

- > Rugged designs, less sensitive to electrical parasitics
- > Superior linear mode operation
- > Design heritage/reuse
- > Well-known Si gate driver setup
- > Simplified circuit topologies
- > Low risk upgrade path



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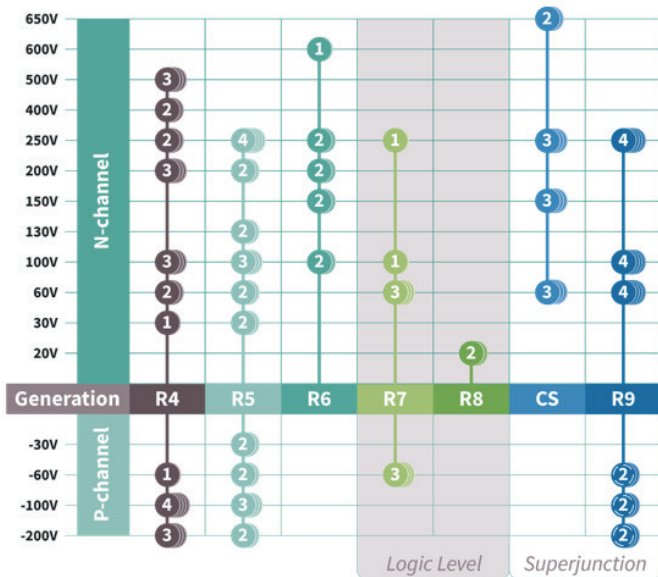
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## Backed by the confidence of QPLs

To help our customers accelerate new product development, IR HiRel's R9 rad hard MOSFETs are qualified for direct release to DLA's Qualified Parts List (QPL) in the newest generation packages. This reduces packaging, assembly, and testing risk, ensuring confidence in the reliability of long-lasting, high performance specification compliance to known industry standards.

IR HiRel continues to make holistic investments in its silicon platforms, packaging, die sizes and more to deliver next-gen technology for space and other demanding applications. We offer the largest portfolio of N- and P-channel power MOSFETs with continuously enhanced performance and packaging. With silicon's proven flight heritage, performance, and robustness, why risk your mission with anything else?

## Rad hard power MOSFET technologies



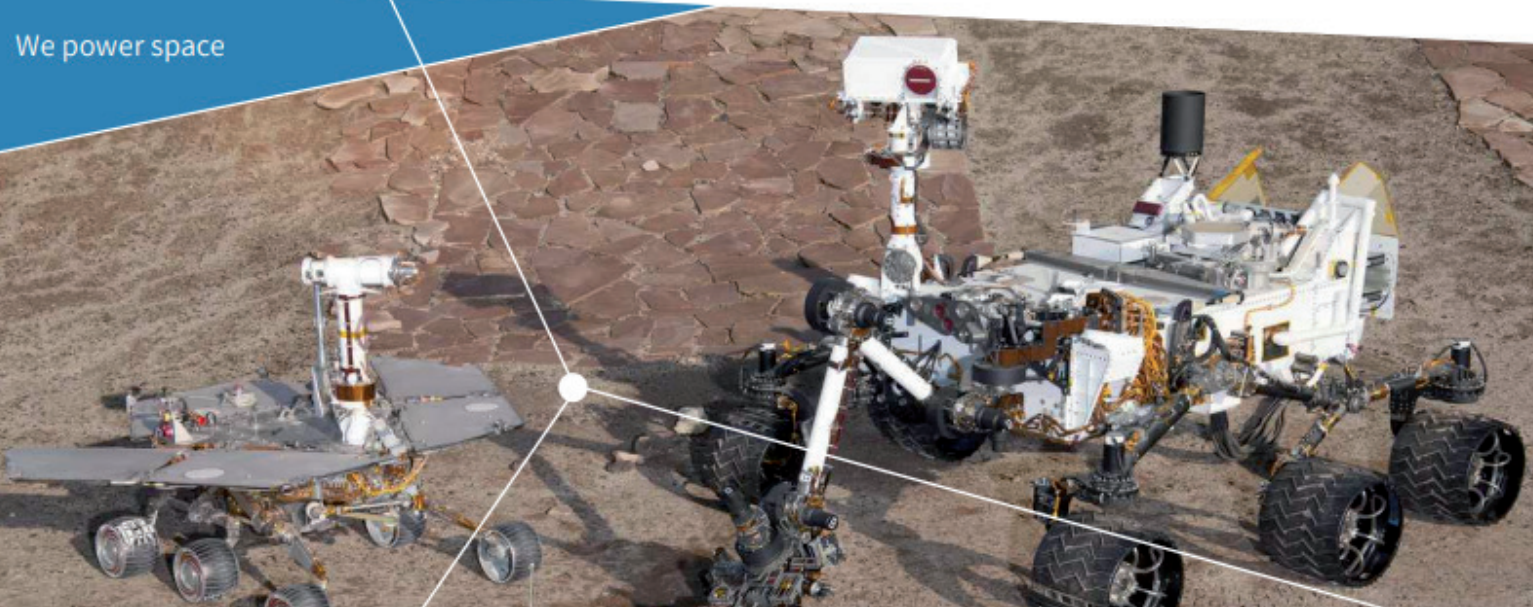
**N-Channel: 20 V to 650 V**

**P-Channel: -30 V to -200 V**

<b>R9</b>	Improved SWaP over prior rad hard MOSFET generations
<b>CS</b>	License-free, based on Infineon CoolMOS™ technology
<b>R8</b>	Designed for low voltage POL designs
<b>R7</b>	Designed for logic level gate drives
<b>R6</b>	Best performance for mid to high-voltage designs
<b>R5</b>	Optimized performance for low to mid-voltage designs
<b>R4</b>	All purpose MOSFET, legacy design with extensive space heritage

# Die sizes available

We power space



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Part number	V <sub>ds</sub> (V)	Ch	I <sub>d</sub> (A)	R <sub>DS(on)</sub> (Ω)	Package	Screening	JEDEC	Slash sheet
IRHNS9A7264	250	N	84	0.0165	SupIR-SMD	JANS	2N7658U2A	/777*
IRHMS9A7264	250	N	45	0.0185	TO-254AA low ohmic	JANS	2N7658T1	/777*
IRHNKC9A7234	250	N	17	0.110	SMD-0.5e ceramic lid	JANS	2N7649U3CE	/775
IRHYB9A7234CM	250	N	17	0.110	TO-257AA tabless low ohmic	JANS	2N7649D5	/775
IRHYS9A7234CM	250	N	17	0.110	TO-257AA low ohmic	JANS	2N7649T3	/775
IRHNMC9A7224	250	N	6	0.138	SMD-0.2 ceramic lid	JANS	2N7654U8C	/776*
IRHNPC9A7214	250	N	5.5	0.500	SMD-0.1 ceramic lid	JANS	2N7657xx*	TBD*
IRHNS9A7160	100	N	100	0.0065	SupIR-SMD	JANS	2N7653U2A	/777*
IRHNKC9A7130	100	N	35	0.034	SMD-0.5e ceramic lid	JANS	2N7648U3CE	/775
IRHYB9A7130CM	100	N	30	0.035	TO-257AA tabless low ohmic	JANS	2N7648D5	/775
IRHYS9A7130CM	100	N	30	0.035	TO-257AA low ohmic	JANS	2N7648T3	/775
IRHNMC9A7120	100	N	23	0.055	SMD-0.2 ceramic lid	JANS	2N7651U8C	/776
IRHNPC9A7110	100	N	6	0.150	SMD-0.1 ceramic lid	JANS	2N7656xx*	TBD*
IRHNS9A7064	60	N	100	0.004	SupIR-SMD	JANS	2N7652U2A	/777
IRHMS9A7064	60	N	45	0.007	TO-254AA low ohmic	JANS	2N7652T1	/777
IRHNKC9A7034	60	N	40	0.018	SMD-0.5e ceramic lid	JANS	2N7647U3CE	/775
IRHYS9A7034CM	60	N	30	0.019	TO-257AA low ohmic	JANS	2N7647T3	/775
IRHYB9A7034CM	60	N	30	0.019	TO-257AA tabless low ohmic	JANS	2N7647D5	/775
IRHNMC9A7024	60	N	25	0.030	SMD-0.2 ceramic lid	JANS	2N7650U8C	/776
IRHNPC9A7014	60	N	9	0.065	SMD-0.1 ceramic lid	JANS	2N7655xx*	TBD*
IRHNS9A97260	-200	P	TBD*	TBD*	SupIR-SMD	JANS	TBD*	TBD*
IRHMS9A97260	-200	P	TBD*	TBD*	TO-254AA low ohmic	JANS	TBD*	TBD*
IRHNKC9A97230	-200	P	9	0.174	SMD-0.5e ceramic lid	JANS	2N7661U3CE	TBD*
IRHYS9A97230CM	-200	P	9	0.175	TO-257AA low ohmic	JANS	2N7661T3	TBD*
IRHNS9A97160	-100	P	55	0.018	SupIR-SMD	JANS	TBD*	TBD*
IRHMS9A97160	-100	P	45	0.019	TO-254AA low ohmic	JANS	TBD*	TBD*
IRHNKC9A97130	-100	P	15	0.072	SMD-0.5e ceramic lid	JANS	2N7660U3CE	TBD*
IRHYS9A97130CM	-100	P	15	0.076	TO-257AA low ohmic	JANS	2N7660T3	TBD*
IRHNS9A97064	-60	P	TBD*	TBD*	SupIR-SMD	JANS	TBD*	TBD*
IRHMS9A97064	-60	P	TBD*	TBD*	TO-254AA low ohmic	JANS	TBD*	TBD*
IRHNKC9A97034	-60	P	20	0.045	SMD-0.5e ceramic lid	JANS	2N7659U3CE	TBD*
IRHYS9A97034CM	-60	P	20	0.046	TO-257AA low ohmic	JANS	2N7659T3	TBD*

\*pending as of publication date

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## Higher performance & efficiencies with low risk design reuse

A pioneer in power electronics since 1947, IR HiRel is a leader in high-reliability, radiation-hardened power conversion solutions for space. For decades, customers have used IR HiRel's semiconductor-based power conversion and custom hybrid solutions in thousands of mission-critical space, aerospace, and national security programs. Applications range from satellite buses to space exploration vehicles and more, where failure-free performance is expected in extreme mechanical, thermal, and radiation environments. Our team of technical experts provides proven, high performance and high-reliability products that reduce development effort and risk for customers, paving the path for successful missions.

IR HiRel is an Infineon Technologies company. Together with our parent company, we offer a broad selection of solutions qualified to ESA and DLA standards for our global customers. Infineon's broad space portfolio includes high-reliability and rad hard memory solutions, power and RF for extreme conditions. Learn more at [www.infineon.com/space](http://www.infineon.com/space).

[www.infineon.com/irhirel](http://www.infineon.com/irhirel)

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We reserve the right to change this document and/or the information given herein at any time.

#### Additional information

For further information on technologies, our products, the application of our products, delivery terms and conditions and/or prices, please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

#### Warnings

Due to technical requirements, our products may contain dangerous substances. For information on the types in question, please contact your nearest International Rectifier HiRel Products, Inc., an Infineon Technologies company, office.

International Rectifier HiRel components may only be used in life-support devices or systems with the expressed written approval of International Rectifier HiRel Products, Inc., an Infineon Technologies company, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system.

Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.