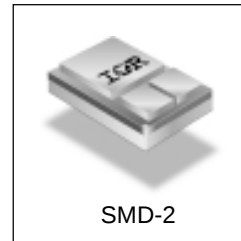


RAD-HARD SYNCHRONOUS RECTIFIER SURFACE MOUNT (SMD-2)

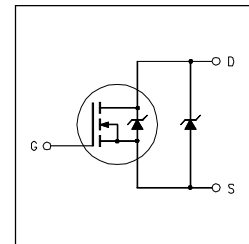
IRHSNA57Z60 30V, N-CHANNEL

Product Summary

Part Number	R _{DS(on)}	Q _G
IRHSNA57Z60	3.5mΩ	200nC



SMD-2



Description:

The SynchFet family of Co-Pack RAD-Hard MOSFETs and Schottky diodes offers the designer an innovative, board space saving solution for switching regulator and power management applications. RAD-Hard MOSFETs utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. Combining this technology with International Rectifier's low forward drop Schottky rectifiers results in an extremely efficient device suitable for use in a wide variety of Military and Space applications.

Features:

- Co-Pack N-channel RAD-Hard MOSFET and Schottky Diode
- Ideal for Synchronous Rectifiers in DC-DC Converters up to 75A Output
- Low Conduction Losses
- Low Switching Losses
- Low V_f Schottky Rectifier
- Refer to IRHSLNA57Z60 for Lower Inductance

Absolute Maximum Ratings

	Parameter		Units
I _D @ V _{GS} = 12V, T _C = 25°C	Continuous Drain or Source Current	75*	A
I _D @ V _{GS} = 12V, T _C = 100°C	Continuous Drain or Source Current	75*	
I _{DM}	Pulse Drain Current ①	300	
P _D @ T _C = 25°C	Power Dissipation	250	W
	Linear Derating Factor	2.0	W/°C
V _{GS}	Gate-to-Source Voltage	±20	V
V _{DS}	Drain-to-Source Voltage	30	
I _{F(AV)} @ V _{GS} = 12V, T _C = 25°C	Schottky and Body Diode Avg. Forward Current③	75*	A
I _{F(AV)} @ V _{GS} = 12V, T _C = 100°C	Schottky and Body Diode Avg. Forward Current③	75*	
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C
	Package Mounting Surface Temperature	300 (for 10sec)	
	Weight	3.3 (Typical)	g

* Current is limited by package

For footnotes refer to the last page

Electrical Characteristics @ T_j = 25°C (Unless Otherwise Specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
BV _{DSS}	Drain-to-Source Breakdown Voltage	30	—	—	V	V _{GS} = 0V, I _D = 1.0mA
R _{DS(on)}	Static Drain-to-Source On-State Resistance	—	—	3.5	mΩ	V _{GS} = 12V, I _D = 45A②
V _{GS(th)}	Gate Threshold Voltage	2.0	—	4.0	V	V _{DS} = V _{GS} , I _D = 1.0mA
g _{fs}	Forward Transconductance	45	—	—	S (Ω)	V _{DS} ≥ 15V, I _{DS} = 45A②
I _{DSS}	Zero Gate Voltage Drain Current	—	—	50	μA	V _{DS} = 24V, V _{GS} = 0V
		—	—	50	mA	V _{DS} = 24V, V _{GS} = 0V, T _j = 125°C
I _{GSS}	Gate-to-Source Leakage Forward	—	—	100	nA	V _{GS} = 20V
I _{GSS}	Gate-to-Source Leakage Reverse	—	—	-100		V _{GS} = -20V
Q _g	Total Gate Charge	—	—	200	nC	V _{GS} = 12V, I _D = 45A, V _{DS} = 15V
Q _{gs}	Gate-to-Source Charge	—	—	55		
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	—	40		
t _{d(on)}	Turn-On Delay Time	—	—	35	ns	V _{DD} = 15V, I _D = 45A, V _{GS} = 12V, R _G = 2.35Ω
t _r	Rise Time	—	—	160		
t _{d(off)}	Turn-Off Delay Time	—	—	78		
t _f	Fall Time	—	—	26		
L _S + L _D	Total Inductance	—	7.03	—	nH	Measured from center of drain pad to center of source pad

Schottky Diode & Body Diode Ratings and Characteristics

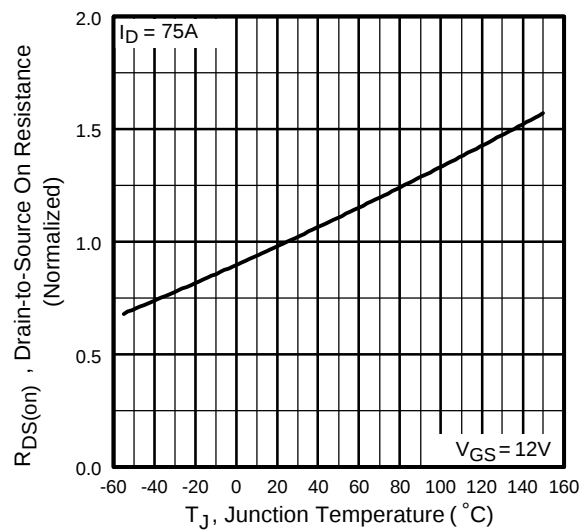
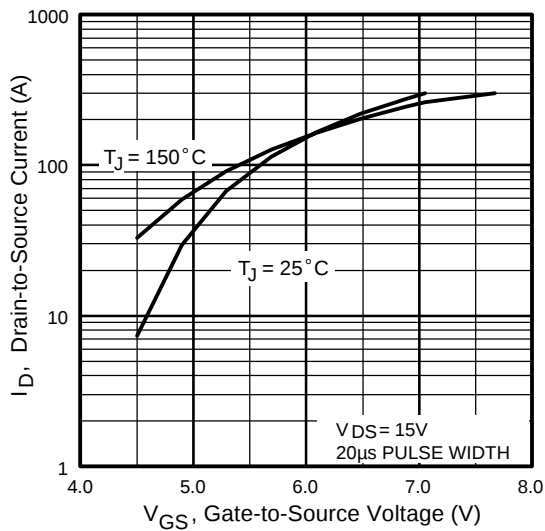
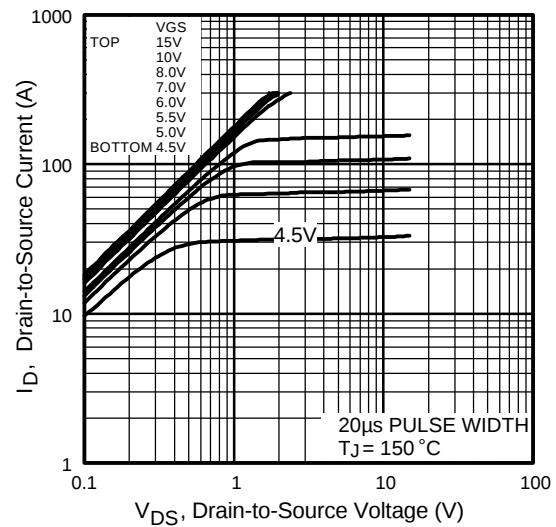
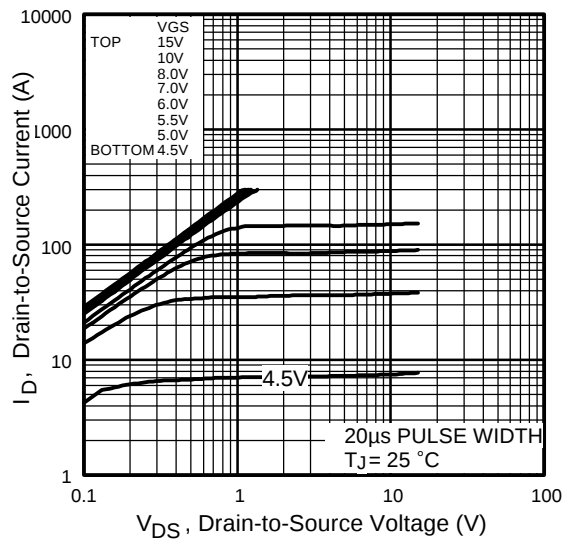
	Parameter	Min	Typ	Max	Units	Test Conditions
V _{SD}	Diode Forward Voltage	—	—	1.15	V	T _j = -55°C, I _D = 45A, V _{GS} = 0V②
		—	—	1.05		T _j = 25°C, I _D = 45A, V _{GS} = 0V②
		—	—	0.95		T _j = 110°C, I _D = 45A, V _{GS} = 0V②
t _{rr}	Reverse Recovery Time	—	—	175	nS	T _j = 25°C, I _F = 45A, di/dt ≤ 100A/μs
Q _{RR}	Reverse Recovery Charge	—	—	500	nC	V _{DS} ≤ 30V
L _S + L _D	Total Inductance	—	8.09	—	nH	Measured from center of drain pad to center of source pad (for Schottky only)
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L _S + L _D				

Thermal Resistance

	Parameter	Min	Typ	Max	Units	Test Conditions
R _{thJC}	Junction-to-Case (MOSFET)	—	—	0.5	°C/W	
R _{thJC}	Junction-to-Case (Schottky)	—	—	0.7		

Note: Corresponding Spice and Saber models are available on the Website.

For footnotes refer to the last page



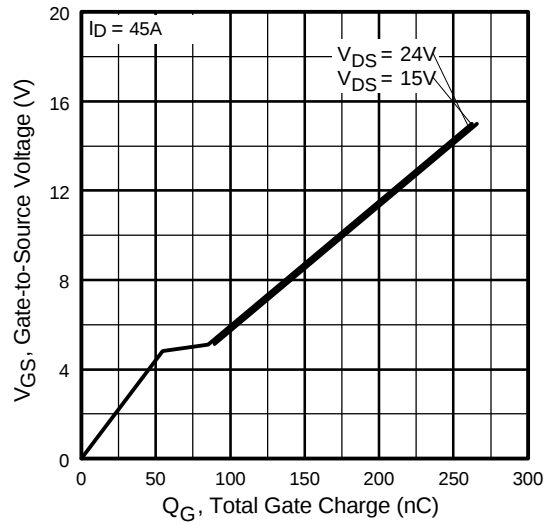


Fig 5. Typical Gate Charge Vs. Gate-to-Source Voltage

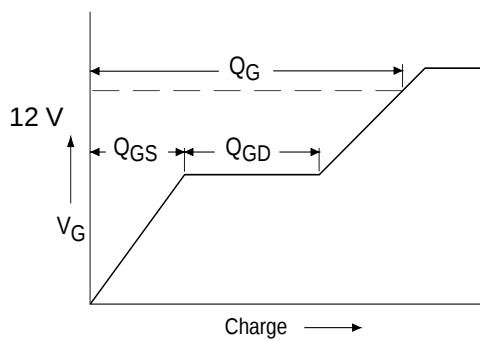


Fig 5a. Basic Gate Charge Waveform

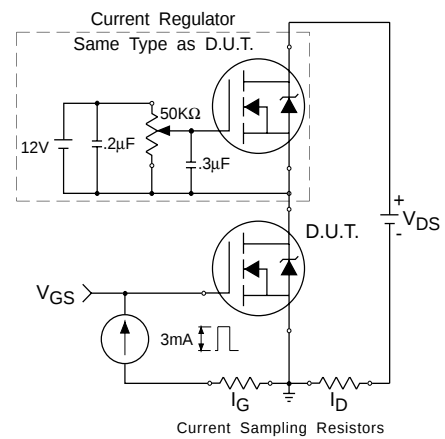


Fig 5b. Gate Charge Test Circuit

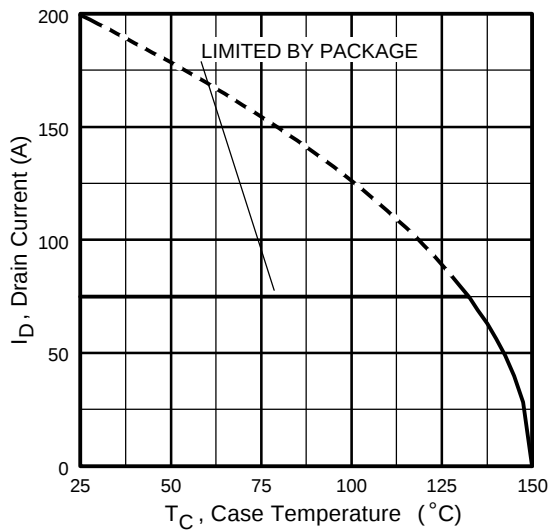


Fig 6. Maximum Drain Current Vs. Case Temperature

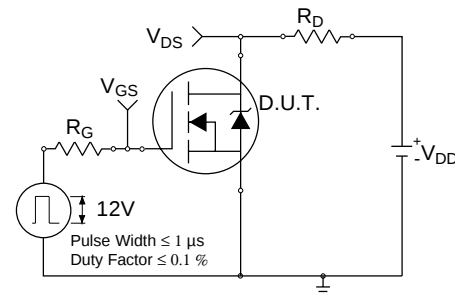


Fig 7a. Switching Time Test Circuit

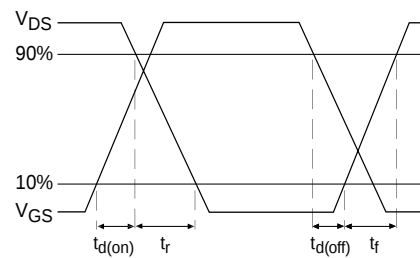


Fig 7b. Switching Time Waveforms

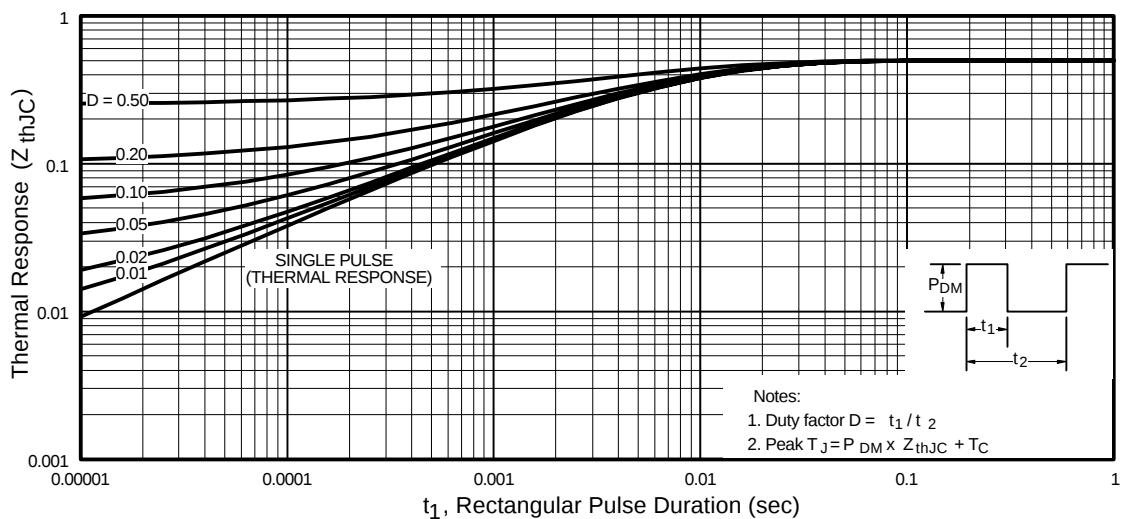


Fig 8. Maximum Effective Transient Thermal Impedance, Junction-to-Case, MOSFET

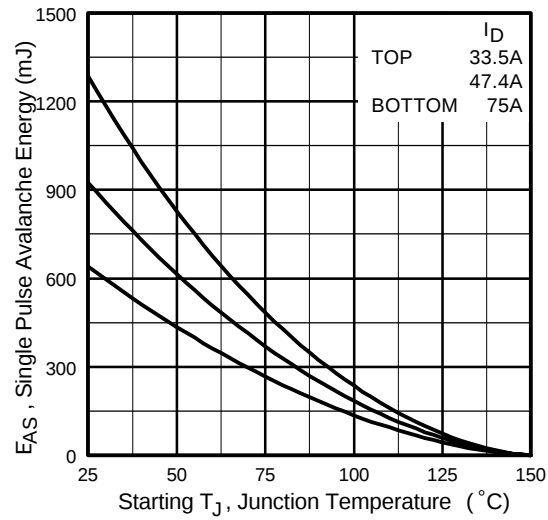


Fig 9. Maximum Avalanche Energy
Vs. Drain Current

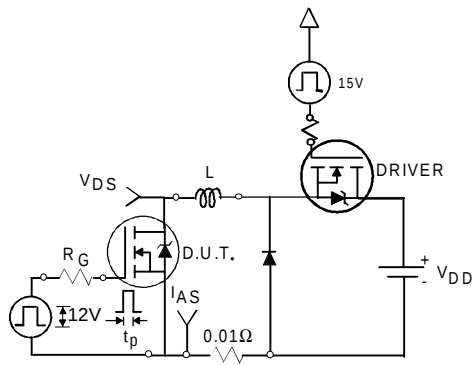


Fig 9a. Unclamped Inductive Test Circuit

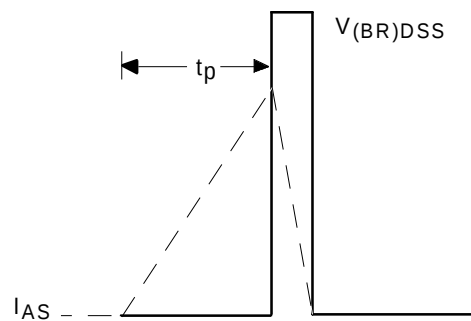


Fig 9b. Unclamped Inductive Waveforms

MOSFET Body Diode & Schottky Diode Characteristics

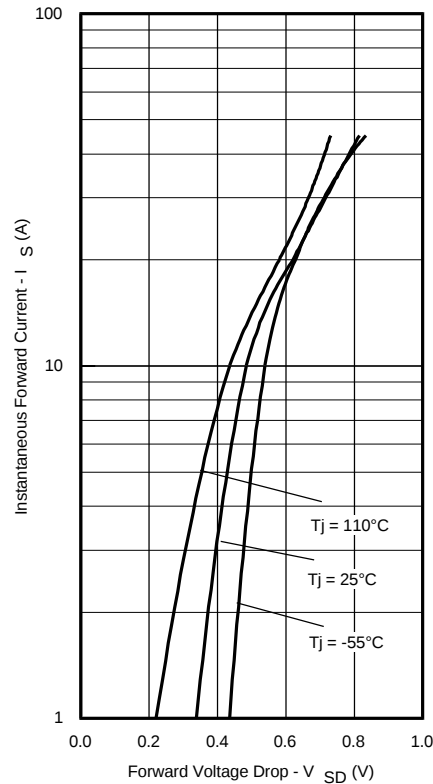


Fig. 10 - Typical Forward Voltage Drop Characteristics

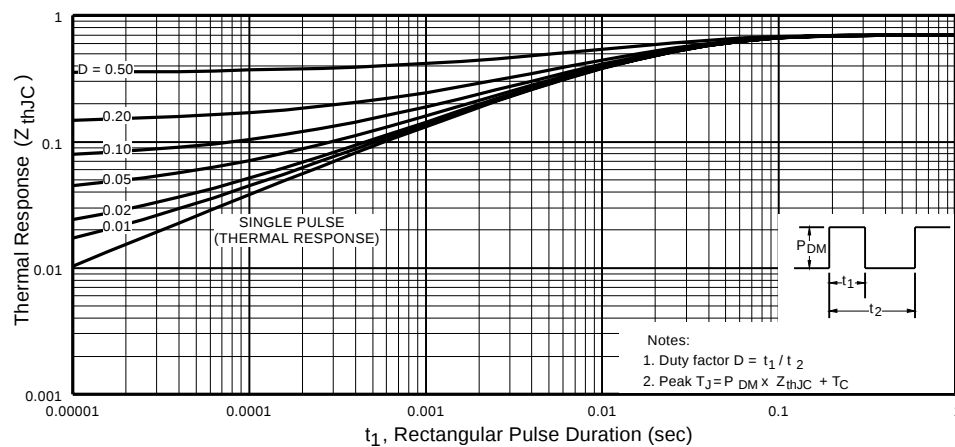


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case, Schottky

International
IOR Rectifier

- ① Repetitive Rating; Pulse width limited by maximum junction temperature
- ② Pulse width $\leq 300 \mu\text{s}$; Duty Cycle $\leq 2\%$
- ③ 50% Duty Cycle, Rectangular

Technical drawing of a mechanical part showing three views: front, side, and top. Dimensions are provided in millimeters (mm) and inches (in).

Front View Dimensions:

- Overall width: 17.65 [.695]
- Overall height: 17.40 [.685]
- Distance from left edge to center of hole 1: 13.46 [.530]
- Distance from center of hole 1 to right edge: 13.21 [.520]
- Distance from center of hole 1 to center of hole 2: 11.30 [.445]
- Distance from center of hole 1 to center of hole 3: 11.05 [.435]
- Distance from center of hole 1 to center of hole 4: 12.19 [.480]
- Distance from center of hole 1 to center of hole 5: 11.94 [.470]
- Distance from center of hole 1 to center of hole 6: 9.50 [.374]
- Distance from center of hole 1 to center of hole 7: 1.99 [.0785]
- Distance from center of hole 1 to center of hole 8: 3.68 [.145]
- Distance from center of hole 1 to center of hole 9: 3.43 [.135]
- Distance from center of hole 1 to center of hole 10: 1.27 [.050]
- Distance from center of hole 1 to center of hole 11: 3.05 [.120]
- Distance from center of hole 1 to center of hole 12: 6.10 [.240]

Side View Dimensions:

- Overall width: 3.58 [.141] MAX.

Top View Dimensions:

- Overall width: 17.65 [.695]
- Overall height: 17.40 [.685]
- Distance from left edge to center of hole 1: 13.46 [.530]
- Distance from center of hole 1 to right edge: 13.21 [.520]
- Distance from center of hole 1 to center of hole 2: 11.30 [.445]
- Distance from center of hole 1 to center of hole 3: 11.05 [.435]
- Distance from center of hole 1 to center of hole 4: 12.19 [.480]
- Distance from center of hole 1 to center of hole 5: 11.94 [.470]
- Distance from center of hole 1 to center of hole 6: 9.50 [.374]
- Distance from center of hole 1 to center of hole 7: 1.99 [.0785]
- Distance from center of hole 1 to center of hole 8: 3.68 [.145]
- Distance from center of hole 1 to center of hole 9: 3.43 [.135]
- Distance from center of hole 1 to center of hole 10: 1.27 [.050]
- Distance from center of hole 1 to center of hole 11: 3.05 [.120]
- Distance from center of hole 1 to center of hole 12: 6.10 [.240]

Feature Control Frames:

- Surface 1: 3 SURFACES, 0.102 [.004]
- Surface 2: 0.254 [.010] M, C, A
- Surface 3: 0.254 [.010] M, C, B
- Surface 4: 0.254 [.010] M, C, B
- Surface 5: 0.254 [.010] M, C, B
- Surface 6: 0.254 [.010] M, C, B
- Surface 7: 0.254 [.010] M, C, B
- Surface 8: 0.254 [.010] M, C, B
- Surface 9: 0.254 [.010] M, C, B
- Surface 10: 0.254 [.010] M, C, B
- Surface 11: 0.254 [.010] M, C, B
- Surface 12: 0.254 [.010] M, C, B

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

- 1 = DRAIN
2 = GATE
3 = SOURCE

International
IOR Rectifier

Visit us at www.irf.com for sales contact information.
Data and specifications subject to change without notice. 03/02