PD-94401

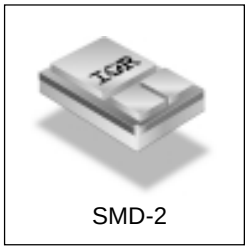
International
IOR Rectifier

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

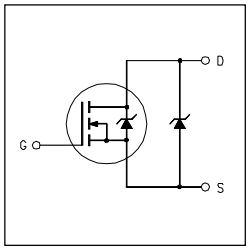
IRHSLNA57064
60V, N-CHANNEL

Product Summary

Part Number	$R_{DS(on)}$	Q_G
IRHSLNA57064	6.1mΩ	180nC



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 Vf Schottky Rectifier
- Refer to IRHSNA57064 for Lower $R_{DS(on)}$

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	60	
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 @ Tj = 25°C (Unless Otherwise Specified)

	Parameter	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	60	—	—	V	V_{GS} = 0V, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-State Resistance	—	—	6.1	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 (℧)	V_{DS} ≥ 15V, I_{DS} = 45A②
I_{DSS}	Zero Gate Voltage Drain Current	—	—	50	µA	V_{DS} = 48V, V_{GS}=0V
		—	—	50	mA	V_{DS} = 48V, 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	—	—	180	nC	V_{GS} =12V, I_D =45A, V_{DS} = 30V
Q_{gs}	Gate-to-Source Charge	—	—	55		
Q_{gd}	Gate-to-Drain ('Miller') Charge	—	—	65		
$t_{d(on)}$	Turn-On Delay Time	—	—	35	ns	V_{DD} = 30V, I_D = 45A, V_{GS} =12V, R_G = 2.35Ω
t_r	Rise Time	—	—	125		
$t_{d(off)}$	Turn-Off Delay Time	—	—	75		
t_f	Fall Time	—	—	50		
$L_S + L_D$	Total Inductance	—	6.6	—	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	—	—	0.93	V	T_J = -55°C, I_D=45A, V_{GS} = 0V②
		—	—	0.86		T_J = 25°C, I_D= 45A, V_{GS} = 0V②
		—	—	0.76		T_J = 110°C, I_D=45A, V_{GS} = 0V②
t_{rr}	Reverse Recovery Time	—	—	100	nS	T_j = 25°C, I_F =45A, di/dt ≤ 100A/µs
Q_{RR}	Reverse Recovery Charge	—	—	210	nC	V_{DS} ≤ 30V
$L_S + L_D$	Total Inductance	—	7.95	—	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

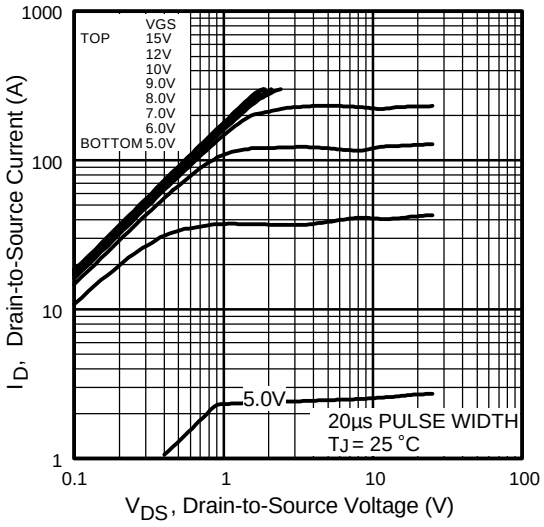


Fig 1. Typical Output Characteristics

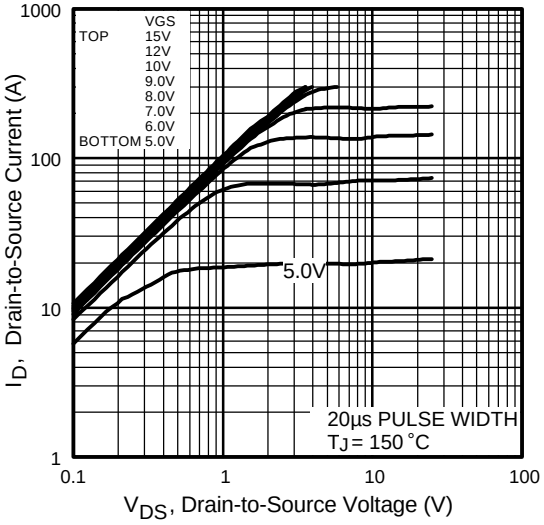


Fig 2. Typical Output Characteristics

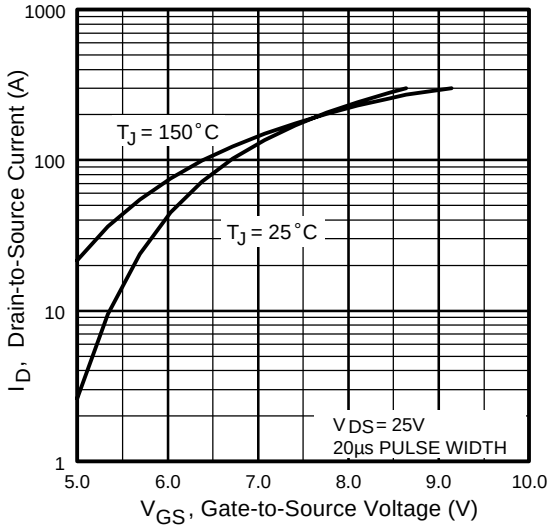


Fig 3. Typical Transfer Characteristics

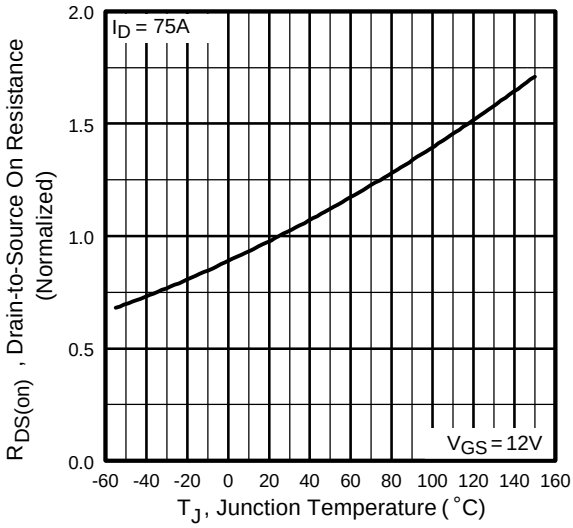


Fig 4. Normalized On-Resistance Vs. Temperature

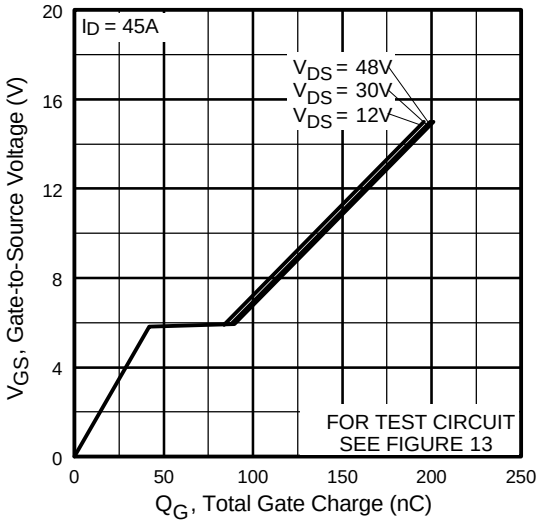


Fig 5. Typical Gate Charge Vs. Gate-to-Source Voltage

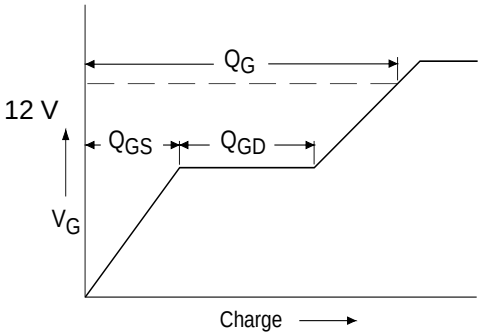


Fig 5a. Basic Gate Charge Waveform

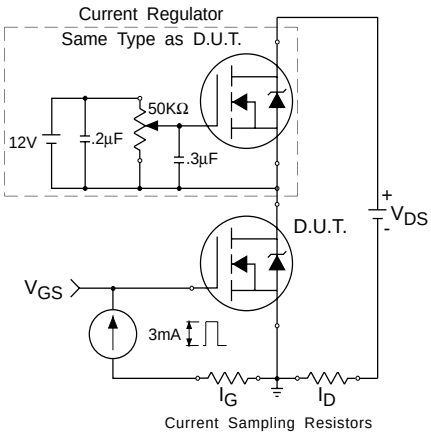


Fig 5b. Gate Charge Test Circuit

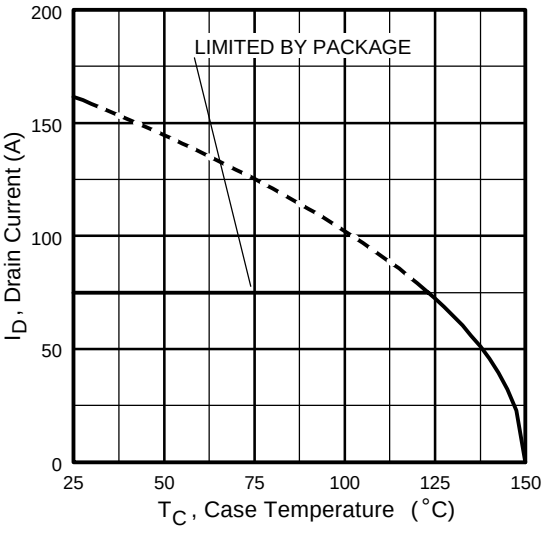


Fig 6. Maximum Drain Current Vs. Case Temperature

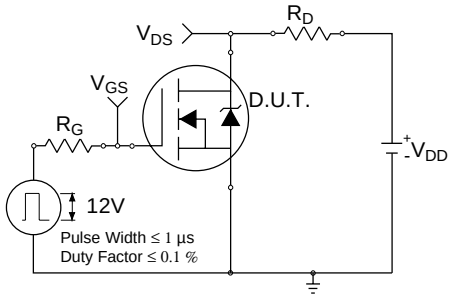


Fig 7a. Switching Time Test Circuit

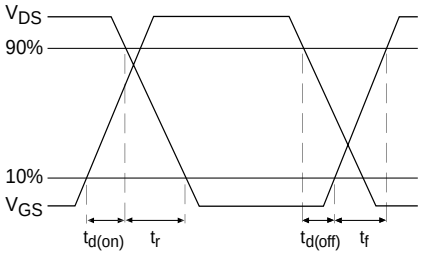


Fig 7b. Switching Time Waveforms

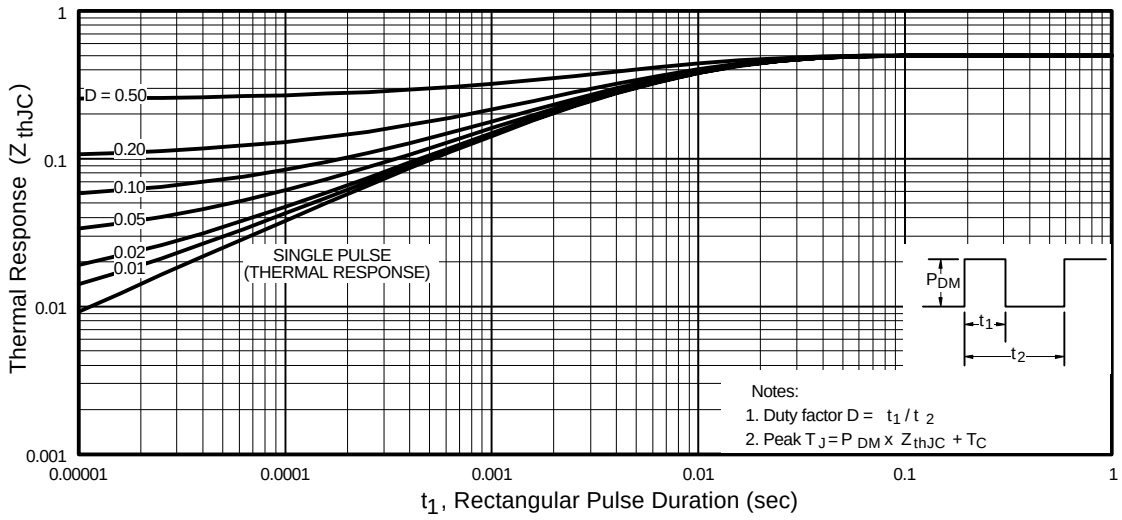


Fig 8. Maximum Effective Transient Thermal Impedance, Junction-to-Case, MOSFET

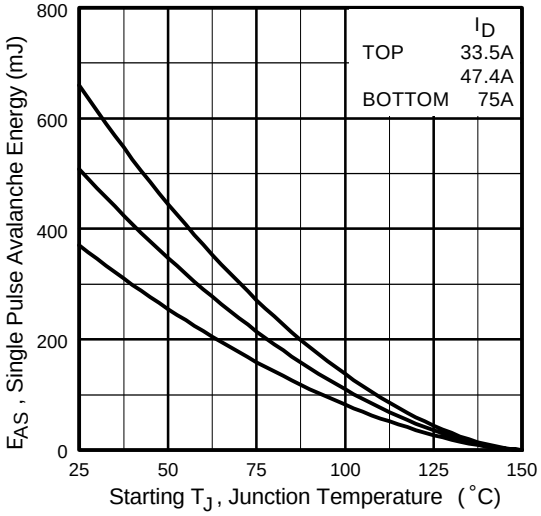


Fig 9. Maximum Avalanche Energy
Vs. Drain Current

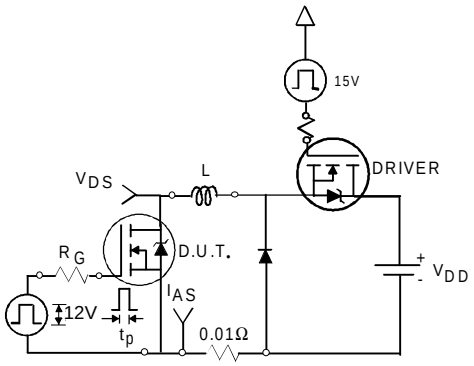


Fig 9a. Unclamped Inductive Test Circuit

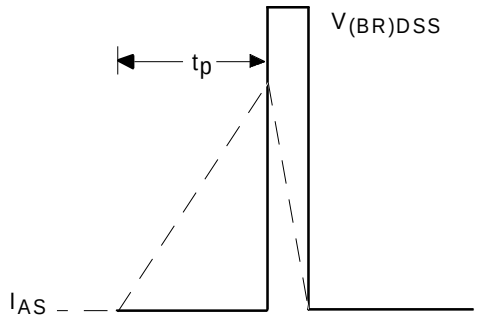


Fig 9b. Unclamped Inductive Waveforms

MOSFET Body Diode & Schottky Diode Characteristics

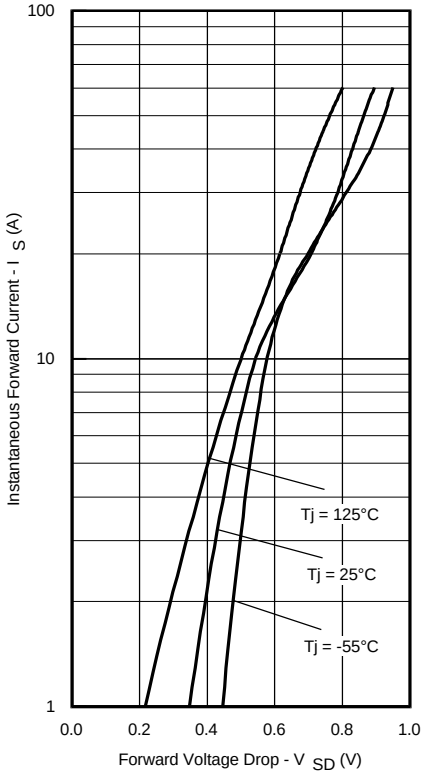


Fig. 10 - Typical Forward Voltage Drop Characterstics

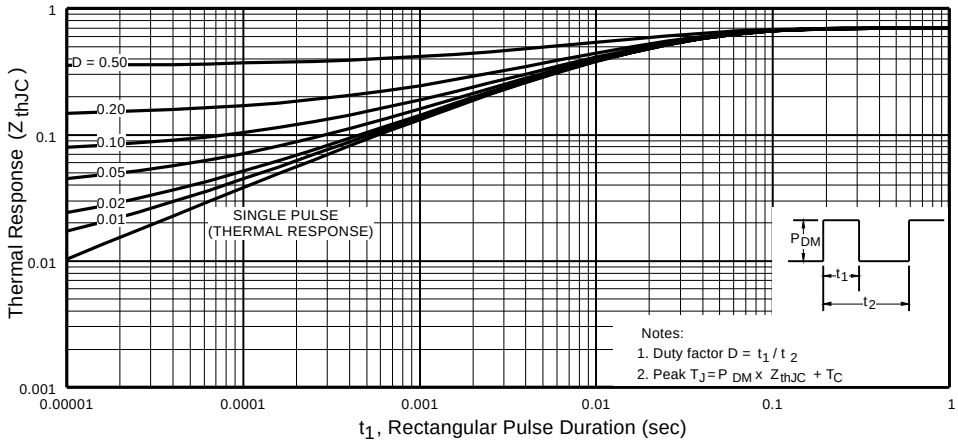
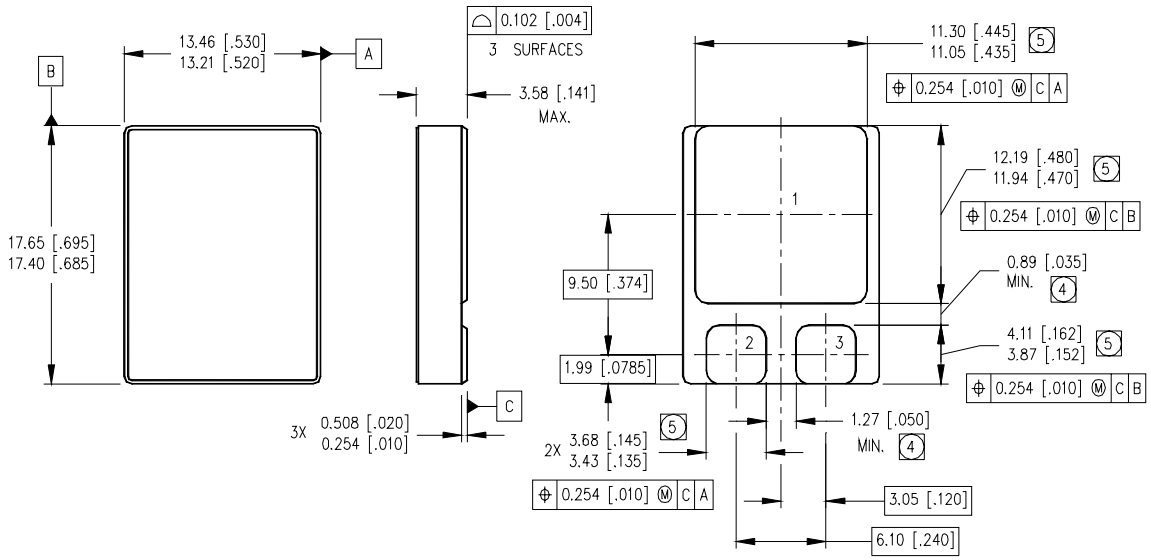


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case, Schottky

Footnotes:

① Repetitive Rating; Pulse width limited by maximum junction temperature
② Pulse width ≤ 300 µs; Duty Cycle ≤ 2%
③ 50% Duty Cycle, Rectangular

Case Outline and Dimensions — SMD-2



NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M–1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. DIMENSION INCLUDES METALLIZATION FLASH.
5. DIMENSION DOES NOT INCLUDE METALLIZATION FLASH.

PAD ASSIGNMENTS

1 = DRAIN
2 = GATE
3 = SOURCE

International
IOR Rectifier

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