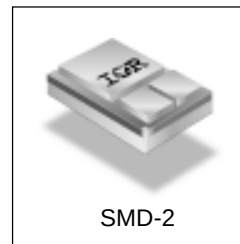


**RAD-HARD  
SYNCHRONOUS RECTIFIER  
SURFACE MOUNT (SMD-2)**

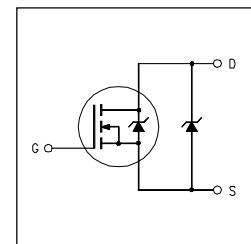
**IRHSLNA57064  
60V, N-CHANNEL**

**Product Summary**

| Part Number  | R <sub>DS(on)</sub> | Q <sub>G</sub> |
|--------------|---------------------|----------------|
| 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 V<sub>f</sub> Schottky Rectifier
- Refer to IRHSLNA57064 for Lower R<sub>DS(on)</sub>

**Absolute Maximum Ratings**

|                                                                    | Parameter                                        |                 | Units |
|--------------------------------------------------------------------|--------------------------------------------------|-----------------|-------|
| I <sub>D</sub> @ V <sub>GS</sub> = 12V, T <sub>C</sub> = 25°C      | Continuous Drain or Source Current               | 75*             | A     |
| I <sub>D</sub> @ V <sub>GS</sub> = 12V, T <sub>C</sub> = 100°C     | Continuous Drain or Source Current               | 75*             |       |
| I <sub>DM</sub>                                                    | Pulse Drain Current ①                            | 300             |       |
| P <sub>D</sub> @ T <sub>C</sub> = 25°C                             | Power Dissipation                                | 250             | W     |
|                                                                    | Linear Derating Factor                           | 2.0             | W/°C  |
| V <sub>GS</sub>                                                    | Gate-to-Source Voltage                           | ±20             | V     |
| V <sub>DS</sub>                                                    | Drain-to-Source Voltage                          | 60              |       |
| I <sub>F(AV)</sub> @ V <sub>GS</sub> = 12V, T <sub>C</sub> = 25°C  | Schottky and Body Diode Avg. Forward Current③    | 75*             | A     |
| I <sub>F(AV)</sub> @ V <sub>GS</sub> = 12V, T <sub>C</sub> = 100°C | Schottky and Body Diode Avg. Forward Current③    | 75*             |       |
| T <sub>J</sub> , T <sub>STG</sub>                                  | 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<sub>J</sub> = 25°C (Unless Otherwise Specified)**

|                                 | Parameter                                  | Min | Typ | Max  | Units | Test Conditions                                                                               |
|---------------------------------|--------------------------------------------|-----|-----|------|-------|-----------------------------------------------------------------------------------------------|
| B <sub>V</sub> D <sub>SS</sub>  | Drain-to-Source Breakdown Voltage          | 60  | —   | —    | V     | V <sub>GS</sub> = 0V, I <sub>D</sub> = 1.0mA                                                  |
| R <sub>DS(on)</sub>             | Static Drain-to-Source On-State Resistance | —   | —   | 6.1  | mΩ    | V <sub>GS</sub> = 12V, I <sub>D</sub> = 45A②                                                  |
| V <sub>GS(th)</sub>             | Gate Threshold Voltage                     | 2.0 | —   | 4.0  | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1.0mA                                    |
| g <sub>fs</sub>                 | Forward Transconductance                   | 45  | —   | —    | S (Ω) | V <sub>DS</sub> ≥ 15V, I <sub>DS</sub> = 45A②                                                 |
| I <sub>DSS</sub>                | Zero Gate Voltage Drain Current            | —   | —   | 50   | μA    | V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0V                                                   |
|                                 |                                            | —   | —   | 50   | mA    | V <sub>DS</sub> = 48V,<br>V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C                        |
| I <sub>GSS</sub>                | Gate-to-Source Leakage Forward             | —   | —   | 100  | nA    | V <sub>GS</sub> = 20V                                                                         |
| I <sub>GSS</sub>                | Gate-to-Source Leakage Reverse             | —   | —   | -100 | nA    | V <sub>GS</sub> = -20V                                                                        |
| Q <sub>g</sub>                  | Total Gate Charge                          | —   | —   | 180  | nC    | V <sub>GS</sub> = 12V, I <sub>D</sub> = 45A,<br>V <sub>DS</sub> = 30V                         |
| Q <sub>gs</sub>                 | Gate-to-Source Charge                      | —   | —   | 55   | nC    |                                                                                               |
| Q <sub>gd</sub>                 | Gate-to-Drain ('Miller') Charge            | —   | —   | 65   | nC    |                                                                                               |
| t <sub>d(on)</sub>              | Turn-On Delay Time                         | —   | —   | 35   | ns    | V <sub>DD</sub> = 30V, I <sub>D</sub> = 45A,<br>V <sub>GS</sub> = 12V, R <sub>G</sub> = 2.35Ω |
| t <sub>r</sub>                  | Rise Time                                  | —   | —   | 125  |       |                                                                                               |
| t <sub>d(off)</sub>             | Turn-Off Delay Time                        | —   | —   | 75   |       |                                                                                               |
| t <sub>f</sub>                  | Fall Time                                  | —   | —   | 50   |       |                                                                                               |
| L <sub>S</sub> + L <sub>D</sub> | Total Inductance                           | —   | 6.6 | —    | nH    | Measured from center of drain pad to center of source pad                                     |

**Schottky Diode & Body Diode Ratings and Characteristics**

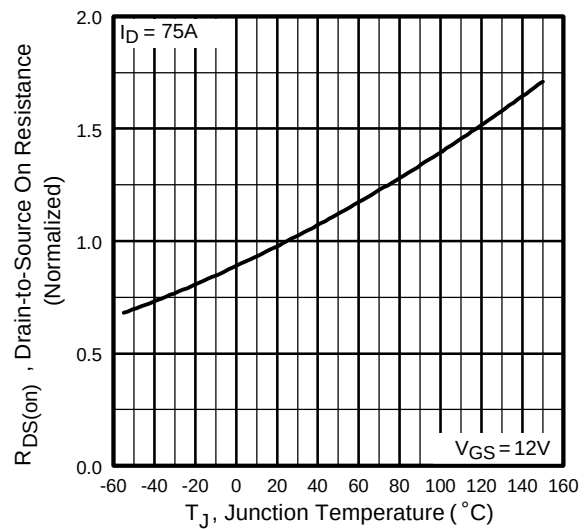
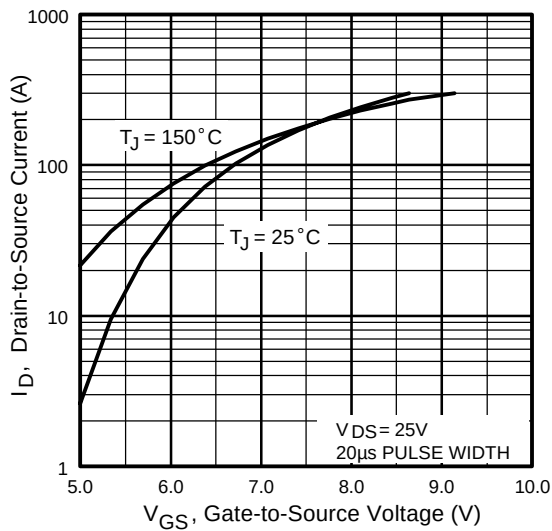
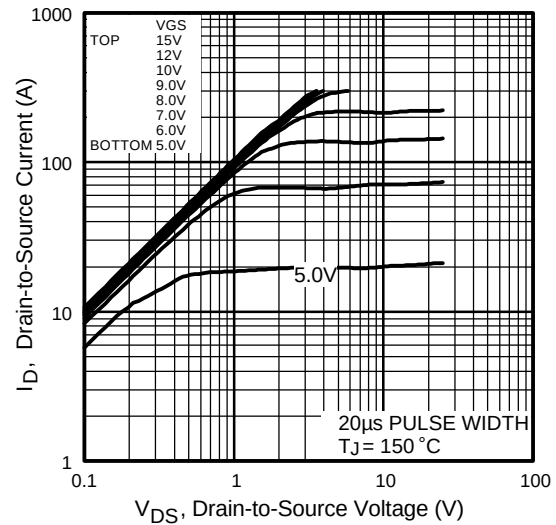
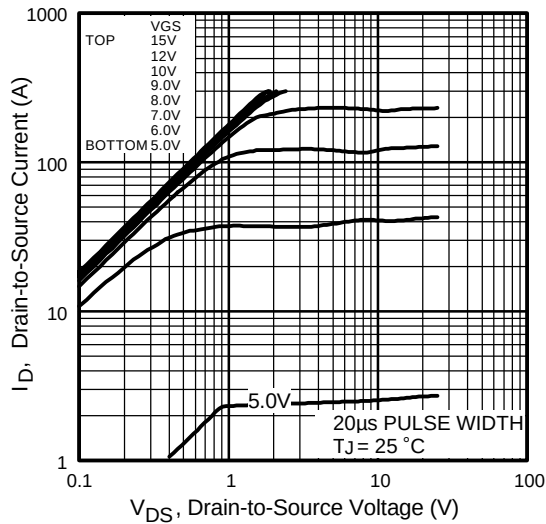
|                                 | Parameter               | Min                                                                                                                | Typ  | Max  | Units | Test Conditions                                                               |
|---------------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------|------|------|-------|-------------------------------------------------------------------------------|
| V <sub>SD</sub>                 | Diode Forward Voltage   | —                                                                                                                  | —    | 0.93 | V     | T <sub>J</sub> = -55°C, I <sub>D</sub> = 45A, V <sub>GS</sub> = 0V②           |
|                                 |                         | —                                                                                                                  | —    | 0.86 |       | T <sub>J</sub> = 25°C, I <sub>D</sub> = 45A, V <sub>GS</sub> = 0V②            |
|                                 |                         | —                                                                                                                  | —    | 0.76 |       | T <sub>J</sub> = 110°C, I <sub>D</sub> = 45A, V <sub>GS</sub> = 0V②           |
| t <sub>rr</sub>                 | Reverse Recovery Time   | —                                                                                                                  | —    | 100  | nS    | T <sub>J</sub> = 25°C, I <sub>F</sub> = 45A, di/dt ≤ 100A/μs                  |
| Q <sub>RR</sub>                 | Reverse Recovery Charge | —                                                                                                                  | —    | 210  | nC    | V <sub>DS</sub> ≤ 30V                                                         |
| L <sub>S</sub> + L <sub>D</sub> | Total Inductance        | —                                                                                                                  | 7.95 | —    | nH    | Measured from center of drain pad to center of source pad (for Schottky only) |
| t <sub>on</sub>                 | Forward Turn-On Time    | Intrinsic turn-on time is negligible. Turn-on speed is substantially controlled by L <sub>S</sub> + L <sub>D</sub> |      |      |       |                                                                               |

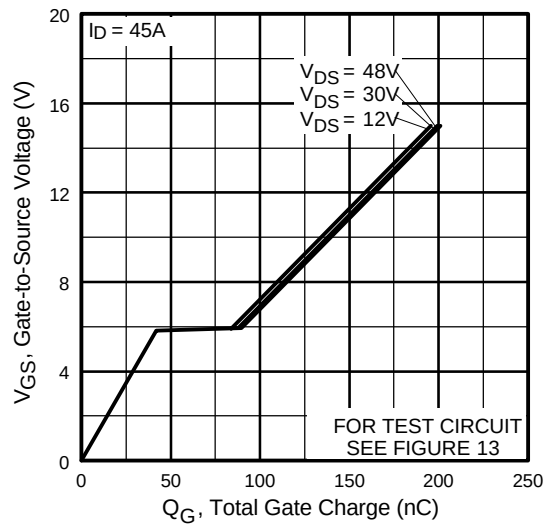
**Thermal Resistance**

|                   | Parameter                   | Min | Typ | Max | Units | Test Conditions |
|-------------------|-----------------------------|-----|-----|-----|-------|-----------------|
| R <sub>thJC</sub> | Junction-to-Case (MOSFET)   | —   | —   | 0.5 | °C/W  |                 |
| R <sub>thJC</sub> | Junction-to-Case (Schottky) | —   | —   | 0.7 |       |                 |

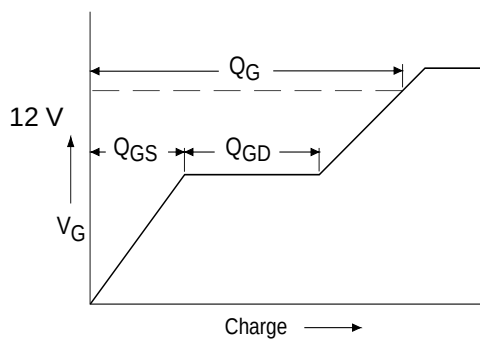
**Note:** Corresponding Spice and Saber models are available on the Website.

For footnotes refer to the last page

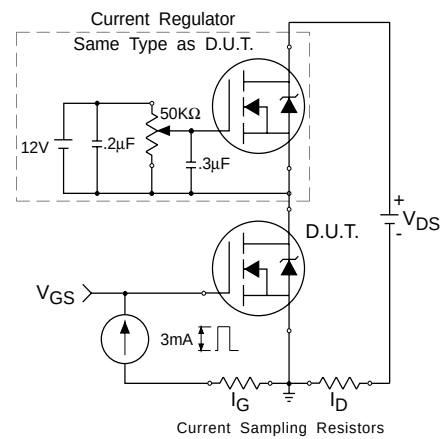




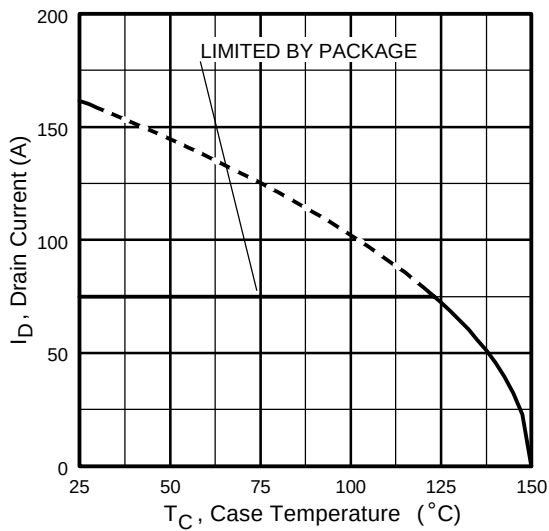
**Fig 5.** Typical Gate Charge Vs. Gate-to-Source Voltage



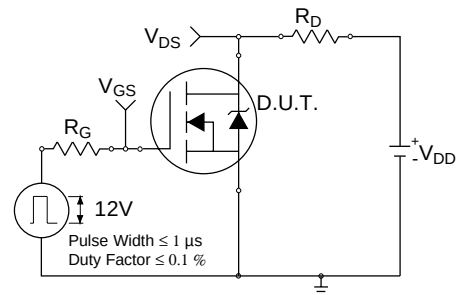
**Fig 5a.** Basic Gate Charge Waveform



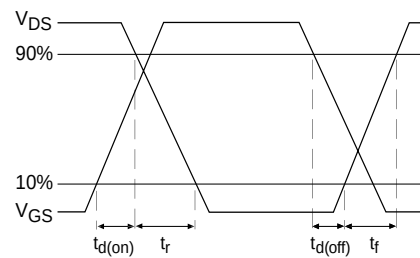
**Fig 5b.** Gate Charge Test Circuit



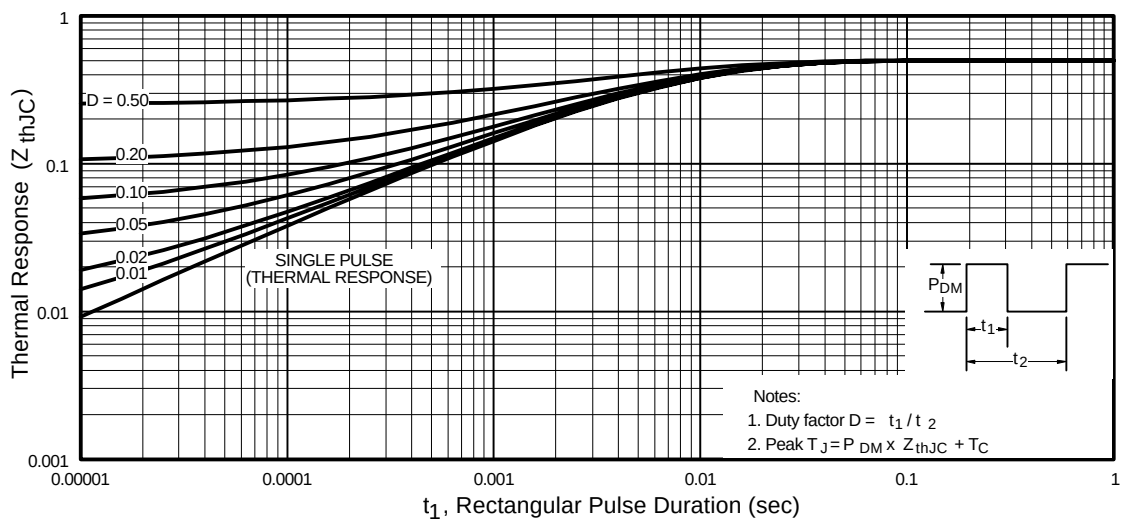
**Fig 6.** Maximum Drain Current Vs. Case Temperature



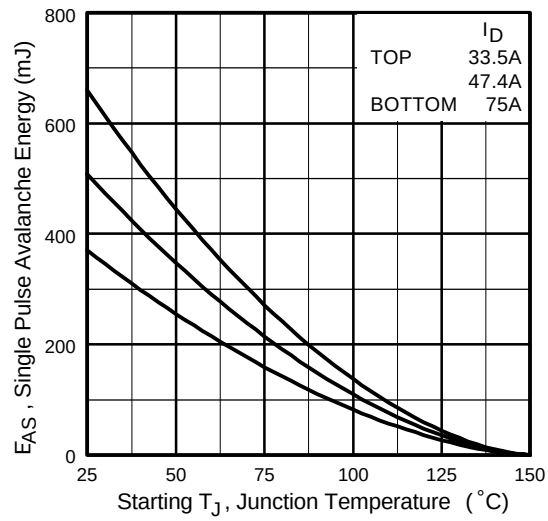
**Fig 7a.** Switching Time Test Circuit



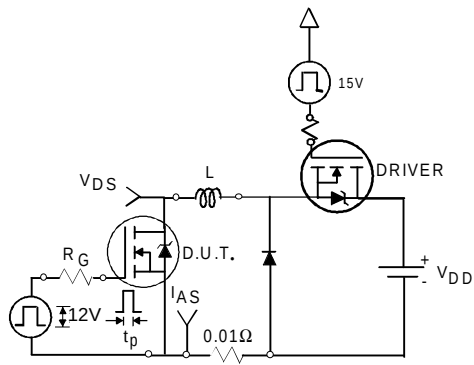
**Fig 7b.** Switching Time Waveforms



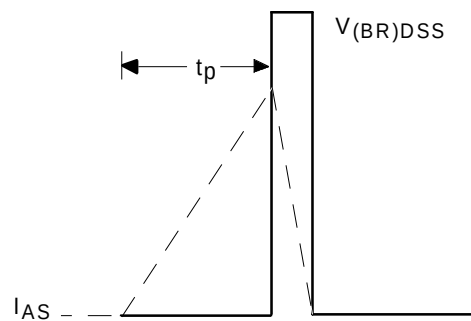
**Fig 8.** Maximum Effective Transient Thermal Impedance, Junction-to-Case, MOSFET



**Fig 9.** Maximum Avalanche Energy  
Vs. Drain Current

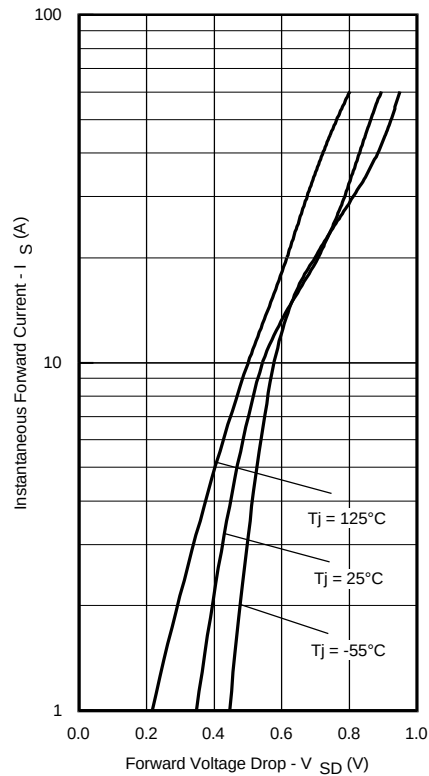


**Fig 9a.** Unclamped Inductive Test Circuit

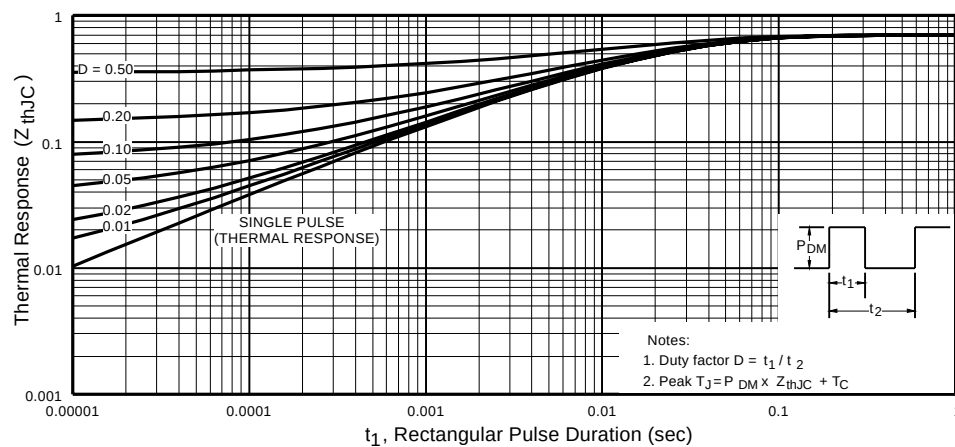


**Fig 9b.** Unclamped Inductive Waveforms

## MOSFET Body Diode & Schottky Diode Characteristics



**Fig. 10** - Typical Forward Voltage Drop Characteristics



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case, Schottky  
www.irf.com

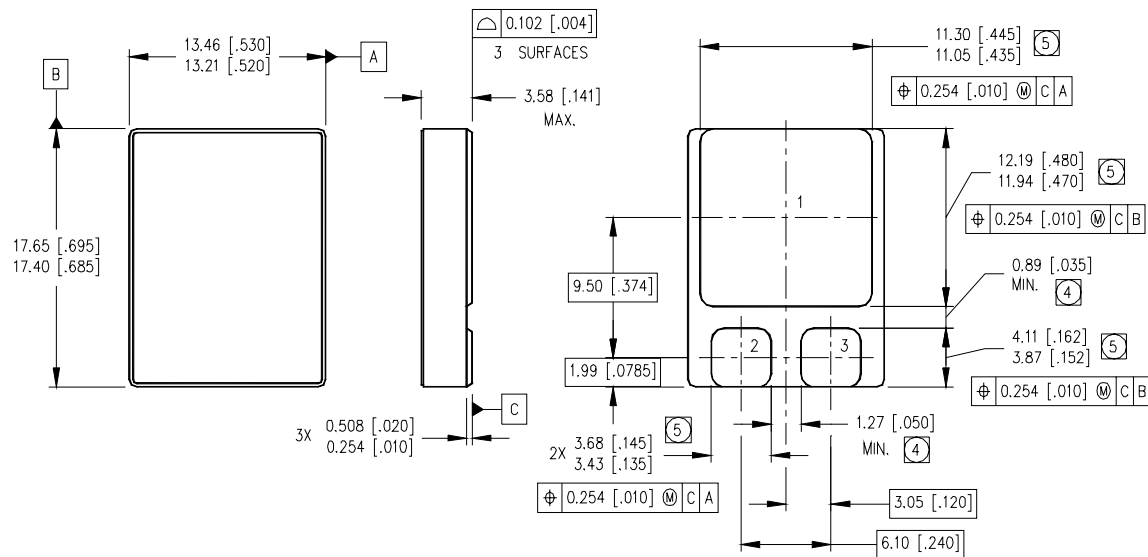
# IRHSLNA57064

International  
**IR** Rectifier

## Footnotes:

- 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

## 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  
**IR** Rectifier

**IR WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105  
TAC Fax: (310) 252-7903

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Data and specifications subject to change without notice. 03/02