

IRFN240 (JANTX2N7219U)

PD-91548D

Power MOSFET Surface Mount (SMD-1) 200V, 18A, N-channel, HEXFET™ MOSFET Technology

Features

- Simple drive requirements
- Hermetically sealed
- Surface Mount
- Dynamic dv/dt rating
- Light-weight

Potential Applications

- DC-DC converter
- Motor drives

Product Validation

Qualified to JANTXV screening flow according to MIL-PRF-19500 for high-reliability applications

Description

IR HiRel HEXFET™ technology is advanced line of power MOSFET transistors. The efficient geometry design achieves very low on-state resistance combined with high transconductance. HEXFET™ transistors also feature all of the well-established advantages of MOSFETs, such as voltage control, fast switching and electrical parameter temperature stability. They are well-suited for applications such as switching power supplies, motor controls, inverters, high energy pulse circuits, and virtually any application where high reliability is required. The HEXFET™ transistor's totally isolated package eliminates the need for additional isolating material between the device and the heatsink. This improves thermal efficiency and reduces drain capacitance.

Ordering Information

Table 1 **Ordering options**

| Part number | Package | Screening Level |
|---------------|---------|-----------------|
| IRFN240 | SMD-1 | COTS |
| JANTX2N7219U | SMD-1 | JANTX |
| JANTXV2N7219U | SMD-1 | JANTXV |

Product Summary

- **Part number:** IRFN240 (JANTX2N7219U), (JANTXV2N7219U)
- **REF:** MIL-PRF-19500/596
- **R_{DS(on),max}:** 18 mΩ
- **I_D:** 18A

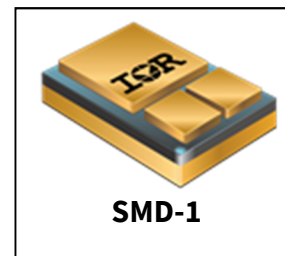


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Absolute Maximum Ratings

1 Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings (Pre-Irradiation)

| Symbol | Parameter | Value | Unit |
|--|--|---------------|------|
| $I_{D1} @ V_{GS} = 10V, T_C = 25^\circ C$ | Continuous Drain Current | 18 | A |
| $I_{D2} @ V_{GS} = 10V, T_C = 100^\circ C$ | Continuous Drain Current | 11 | A |
| $I_{DM} @ T_C = 25^\circ C$ | Pulsed Drain Current ¹ | 72 | A |
| $P_D @ T_C = 25^\circ C$ | Maximum Power Dissipation | 125 | W |
| | Linear Derating Factor | 1.0 | W/°C |
| V_{GS} | Gate-to-Source Voltage | ± 20 | V |
| E_{AS} | Single Pulse Avalanche Energy ² | 450 | mJ |
| I_{AR} | Avalanche Current ¹ | 18 | A |
| E_{AR} | Repetitive Avalanche Energy ¹ | 12.5 | mJ |
| dv/dt | Peak Diode Reverse Recovery ³ | 5.0 | V/ns |
| T_J T_{STG} | Operating Junction and Storage Temperature Range | -55 to +150 | °C |
| | Lead Temperature | 300 (for 5s) | |
| | Weight | 2.6 (Typical) | |

¹ Repetitive Rating; Pulse width limited by maximum junction temperature.

² $V_{DD} = 50V$, starting $T_J = 25^\circ C$, $L = 1.3mH$, Peak $I_L = 18A$, $V_{GS} = 10V$

³ $I_{SD} \leq 18A$, $di/dt \leq 150A/\mu s$, $V_{DD} \leq 200V$, $T_J \leq 150^\circ C$

Device Characteristics

2 Device Characteristics

2.1 Electrical Characteristics (Pre-Irradiation)

Table 3 Static and Dynamic Electrical Characteristics @ T_j = 25°C (Unless Otherwise Specified)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|-------------------------------------|--|------|------|------|------|--|
| BV _{DSS} | Drain-to-Source Breakdown Voltage | 200 | — | — | V | V _{GS} = 0V, I _D = 1.0mA |
| ΔBV _{DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | — | 0.29 | — | V/°C | Reference to 25°C, I _D = 1.0mA |
| R _{DS(on)} | Static Drain-to-Source On-State Resistance | — | — | 0.18 | Ω | V _{GS} = 10V, I _{D2} = 11A ¹ |
| | | — | — | 0.25 | | V _{GS} = 10V, I _{D2} = 18A ¹ |
| V _{GS(th)} | Gate Threshold Voltage | 2.0 | — | 4.0 | V | V _{DS} = V _{GS} , I _D = 250μA |
| G _{fs} | Forward Transconductance | 6.1 | — | — | S | V _{DS} = 15V, I _{D2} = 11A ¹ |
| I _{DSS} | Zero Gate Voltage Drain Current | — | — | 25 | μA | V _{DS} = 160V, V _{GS} = 0V |
| | | — | — | 250 | | V _{DS} = 160V, V _{GS} = 0V, T _J = 125°C |
| I _{GSS} | Gate-to-Source Leakage Forward | — | — | 100 | nA | V _{GS} = 20V |
| | Gate-to-Source Leakage Reverse | — | — | -100 | | V _{GS} = -20V |
| Q _G | Total Gate Charge | — | — | 60 | nC | I _{D1} = 18A |
| Q _{GS} | Gate-to-Source Charge | — | — | 14.6 | | V _{DS} = 100V |
| Q _{GD} | Gate-to-Drain ('Miller') Charge | — | — | 37.6 | | V _{GS} = 10V |
| t _{d(on)} | Turn-On Delay Time | — | — | 20 | ns | I _{D1} = 18A ** |
| t _r | Rise Time | — | — | 105 | | V _{DD} = 100V |
| t _{d(off)} | Turn-Off Delay Time | — | — | 58 | | R _G = 9.1Ω |
| t _f | Fall Time | — | — | 67 | | V _{GS} = 10V |
| L _S + L _D | Total Inductance | — | 4.0 | — | nH | Measured from the center of drain pad to center of source pad. |
| C _{iss} | Input Capacitance | — | 1300 | — | pF | V _{GS} = 0V |
| C _{oss} | Output Capacitance | — | 400 | — | | V _{DS} = 25V |
| C _{rss} | Reverse Transfer Capacitance | — | 130 | — | | f = 1.0MHz |

** Switching speed maximum limits are based on manufacturing test equipment and capability.

¹ Pulse width ≤ 300 μs; Duty Cycle ≤ 2%

Device Characteristics

2.2 Source-Drain Diode Ratings and Characteristics (Pre-Irradiation)

Table 4 Source-Drain Diode Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Test Conditions |
|----------|---|---|------|------|---------------|--|
| I_S | Continuous Source Current (Body Diode) | — | — | 18 | A | |
| I_{SM} | Pulsed Source Current (Body Diode) ¹ | — | — | 72 | A | |
| V_{SD} | Diode Forward Voltage | — | — | 1.5 | V | $T_J = 25^\circ\text{C}$, $I_S = 18\text{A}$, $V_{GS} = 0\text{V}$ ² |
| t_{rr} | Reverse Recovery Time | — | — | 500 | ns | $T_J = 25^\circ\text{C}$, $I_F = 18\text{A}$, $V_{DD} \leq 50\text{V}$ $di/dt = 100\text{A}/\mu\text{s}$ ² |
| Q_{rr} | Reverse Recovery Charge | — | — | 5.3 | μC | |
| t_{on} | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D) | | | | |

2.3 Thermal Characteristics

Table 5 Thermal Resistance

| Symbol | Parameter | Min. | Typ. | Max. | Unit |
|--------------------|-----------------------|------|------|------|---------------------------|
| $R_{\theta JC}$ | Junction-to-Case | — | — | 1.0 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta J-PCB}$ | Junction-to-PCB board | — | 4.0 | — | |

¹ Repetitive Rating; Pulse width limited by maximum junction temperature.

² Pulse width $\leq 300 \mu\text{s}$; Duty Cycle $\leq 2\%$

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Power MOSFET Surface Mount (SMD-1)

Electrical Characteristics Curves (Pre-irradiation)

3 Electrical Characteristics Curves (Pre-irradiation)

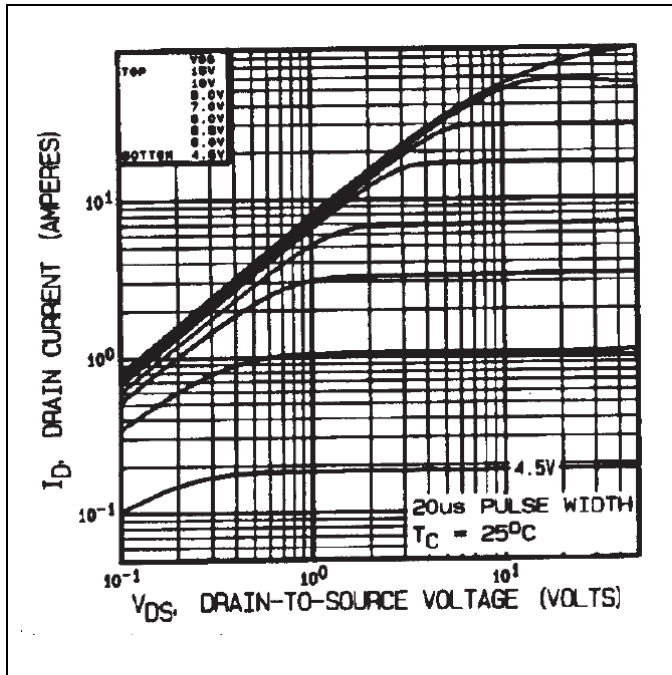


Figure 1 Typical Output Characteristics

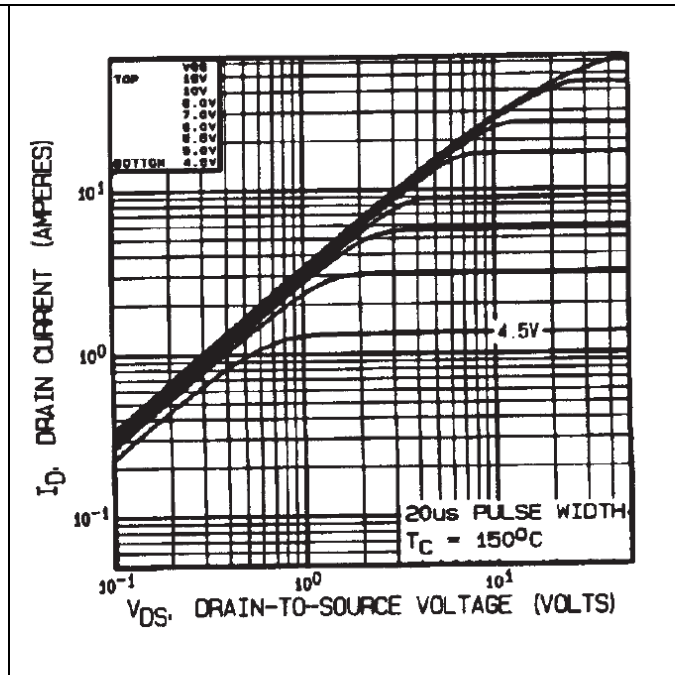


Figure 2 Typical Output Characteristics

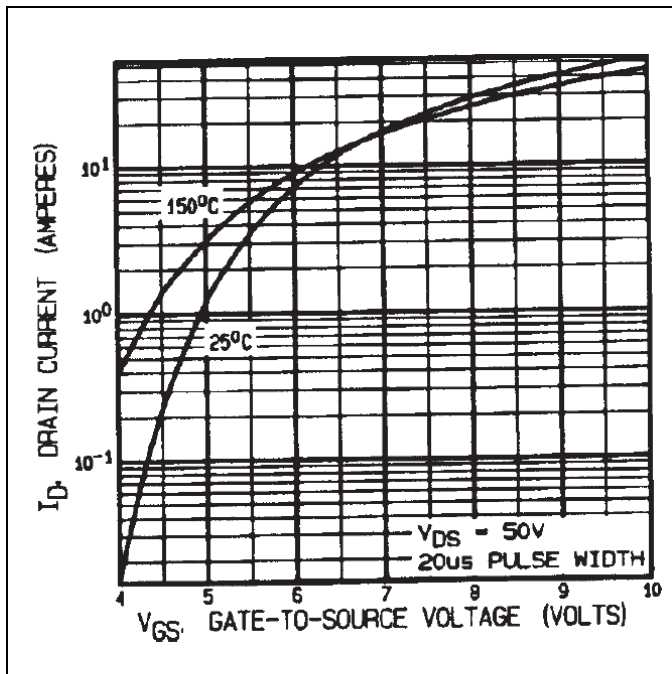


Figure 3 Typical Transfer Characteristics

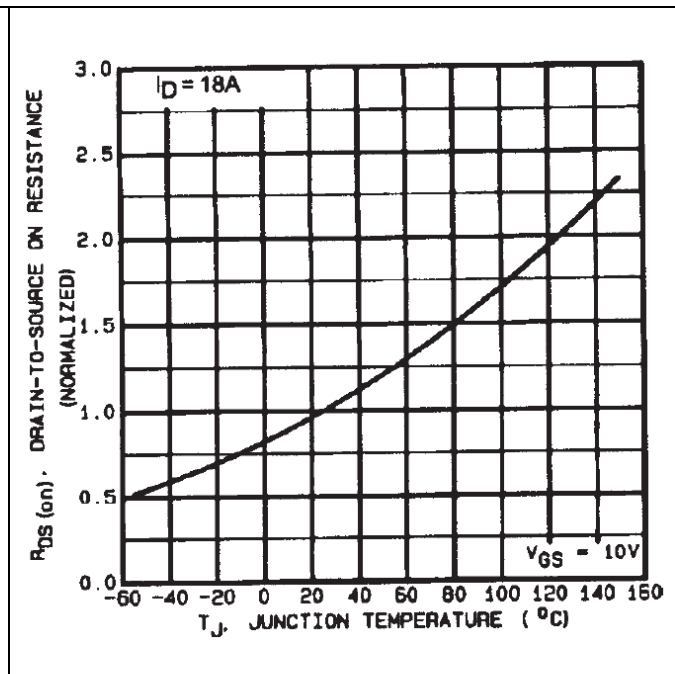


Figure 4 Normalized On-Resistance Vs. Temperature

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Power MOSFET Surface Mount (SMD-1)

Electrical Characteristics Curves (Pre-irradiation)

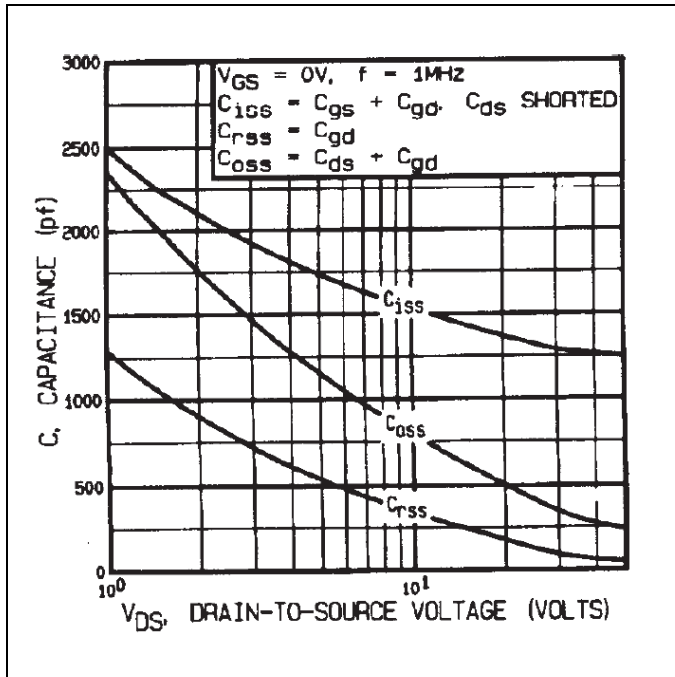


Figure 5 Typical Capacitance Vs. Drain-to-Source Voltage

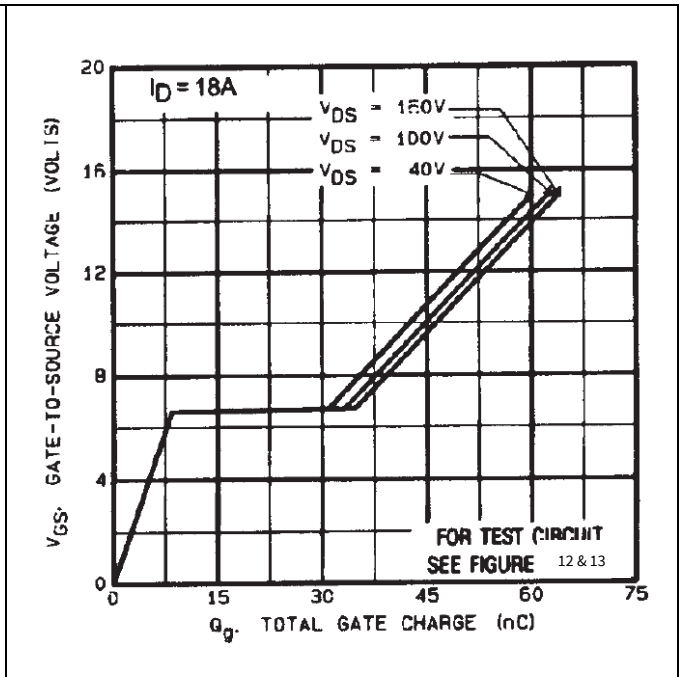


Figure 6 Typical Gate Charge Vs. Gate-to-Source Voltage

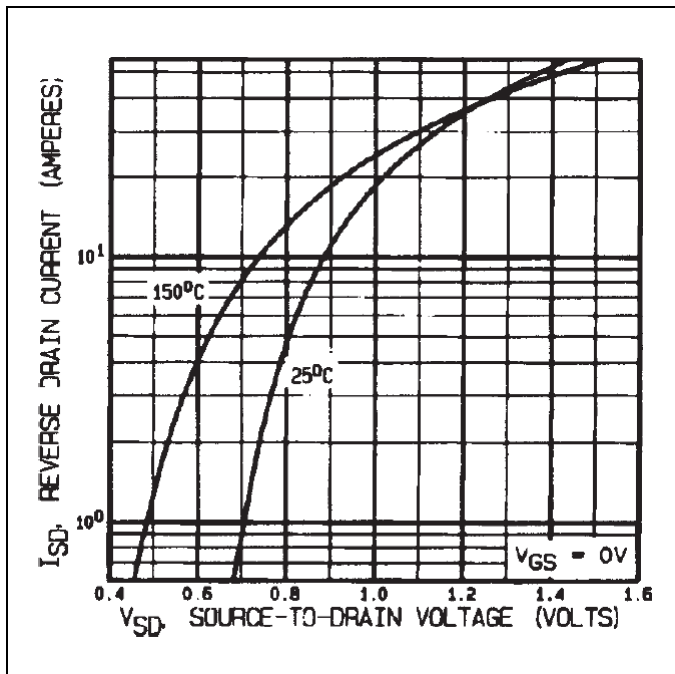


Figure 7 Typical Source-Drain Current Vs. Diode Forward Voltage

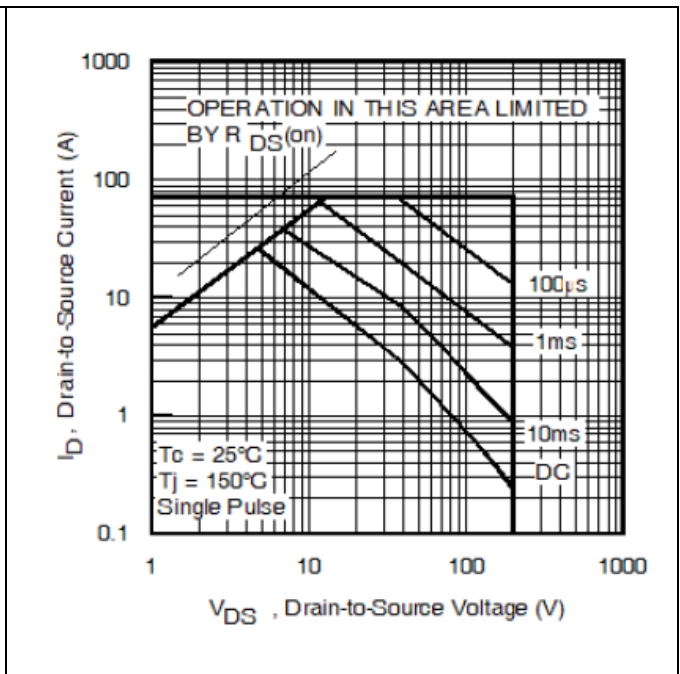


Figure 8 Maximum Safe Operating Area

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Power MOSFET Surface Mount (SMD-1)
Electrical Characteristics Curves (Pre-irradiation)

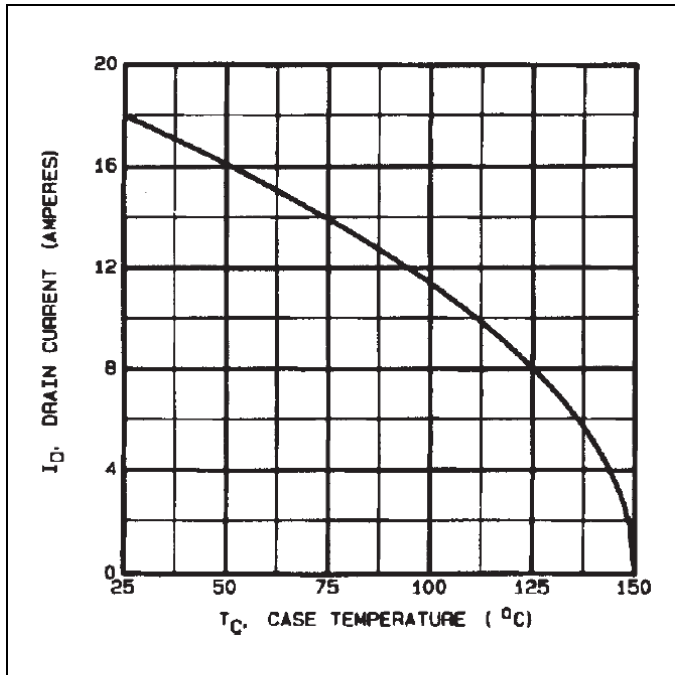


Figure 9 Maximum Drain Current Vs. Case Temperature

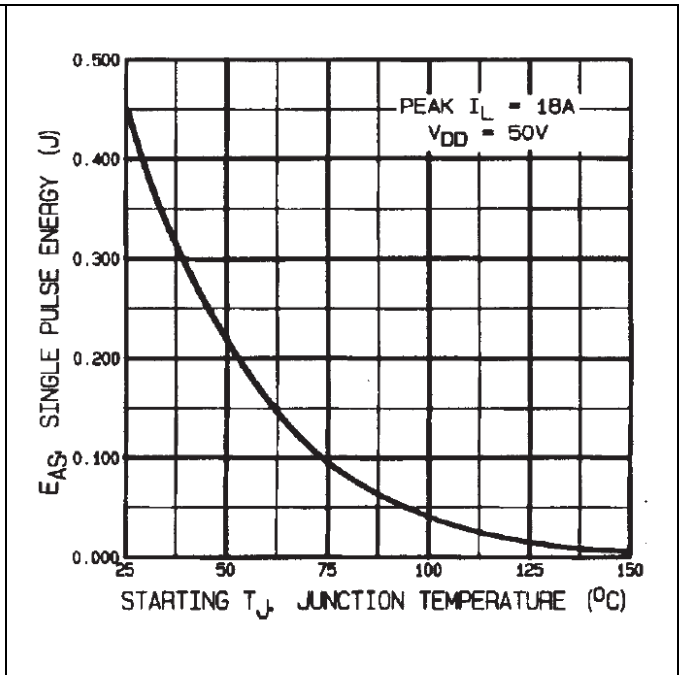


Figure 10 Maximum Avalanche Energy Vs. Junction Temperature

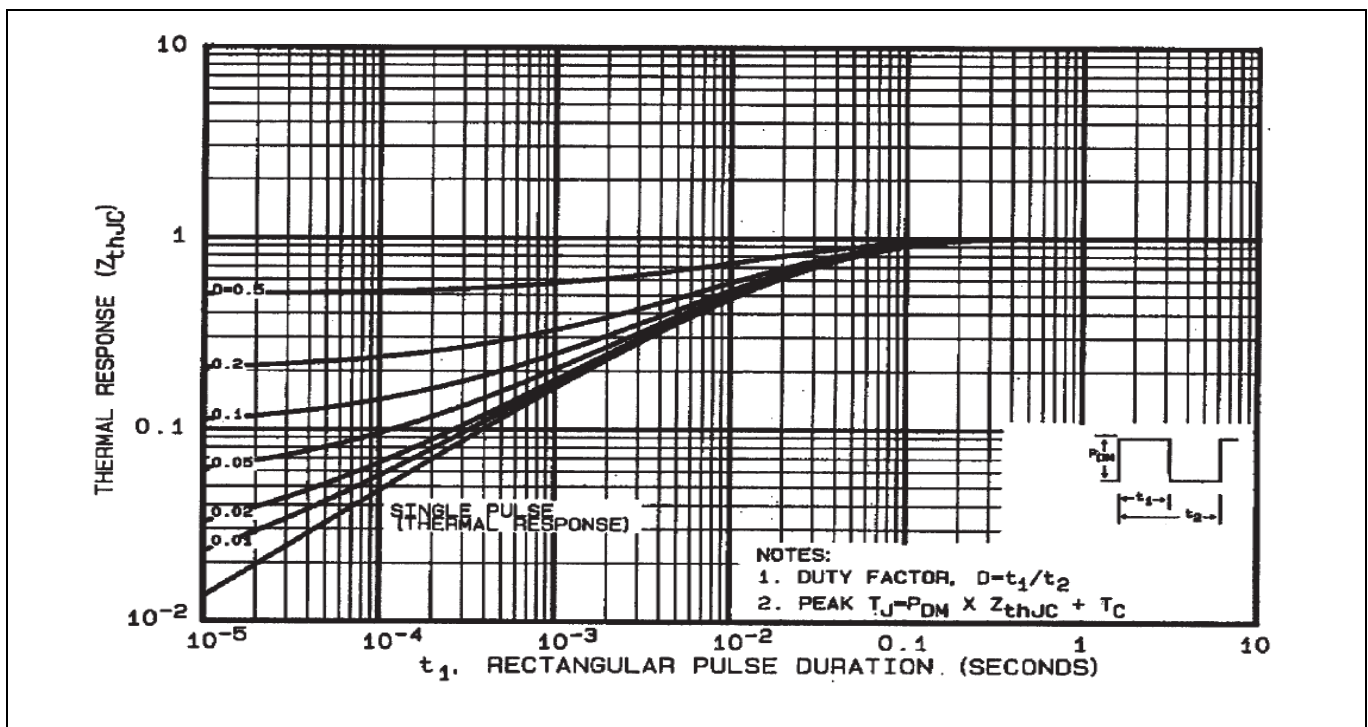


Figure 11 Maximum Effective Transient Thermal Impedance, Junction-to-Case

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Power MOSFET Surface Mount (SMD-1)

Test Circuits (Pre-irradiation)

4 Test Circuits (Pre-irradiation)

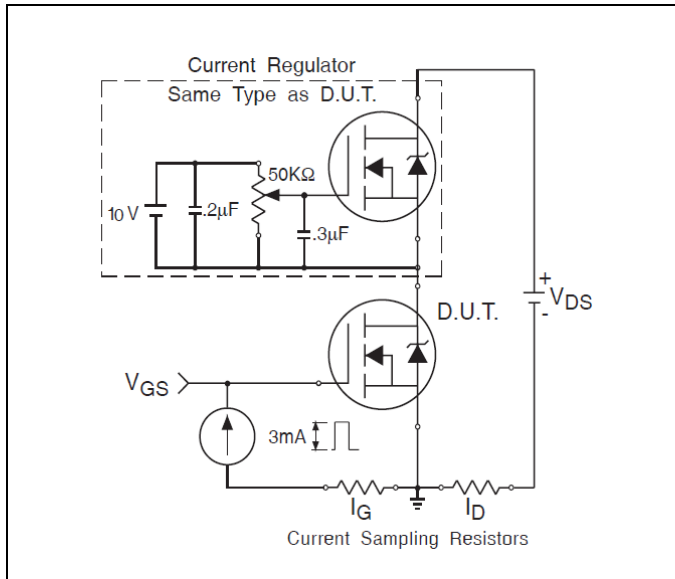


Figure 12 Gate Charge Test Circuit

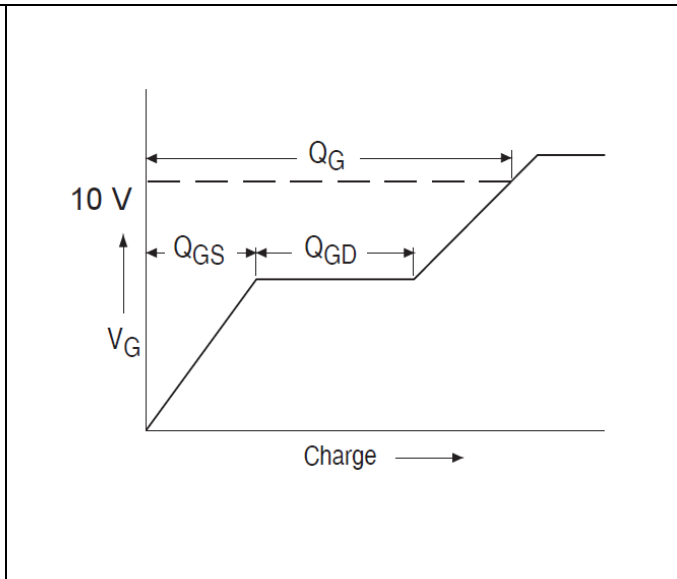


Figure 13 Gate Charge Waveform

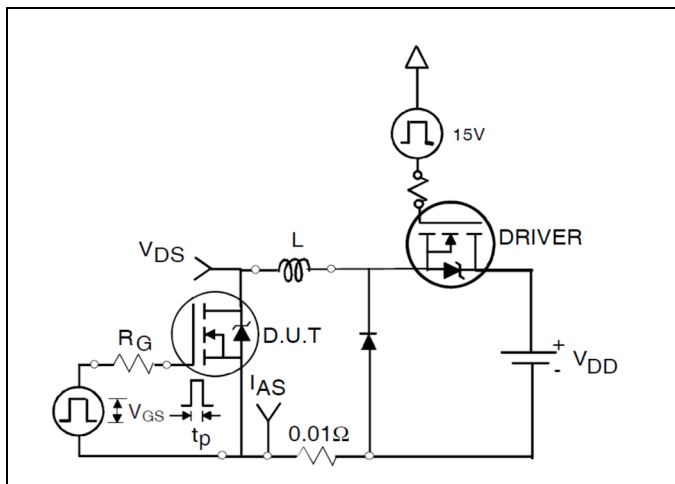


Figure 14 Unclamped Inductive Test Circuit

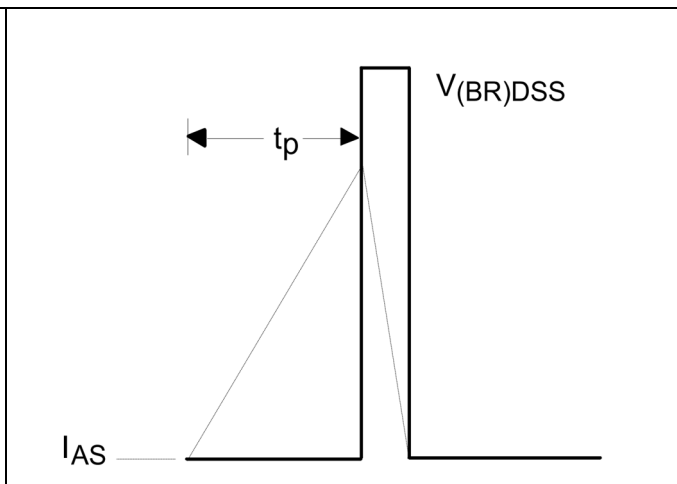


Figure 15 Unclamped Inductive Waveform

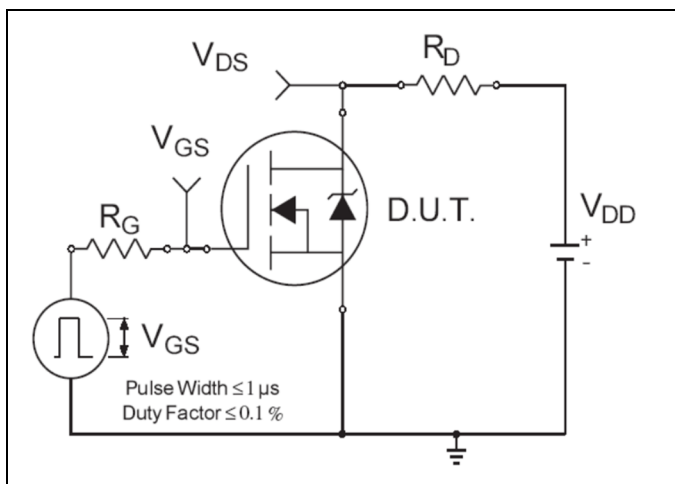


Figure 16 Switching Time Test Circuit

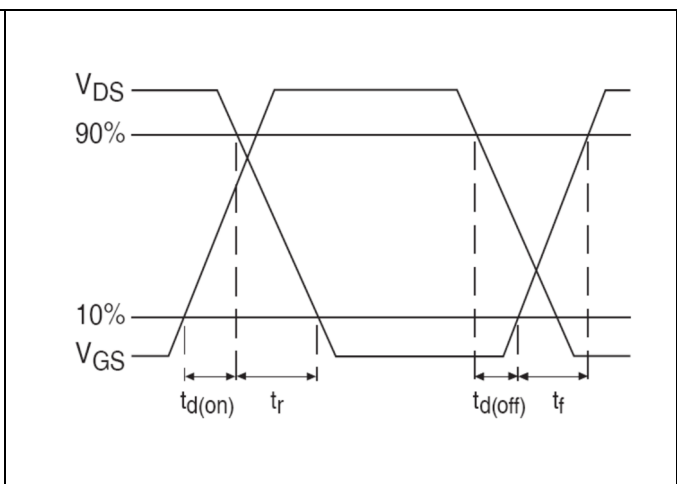


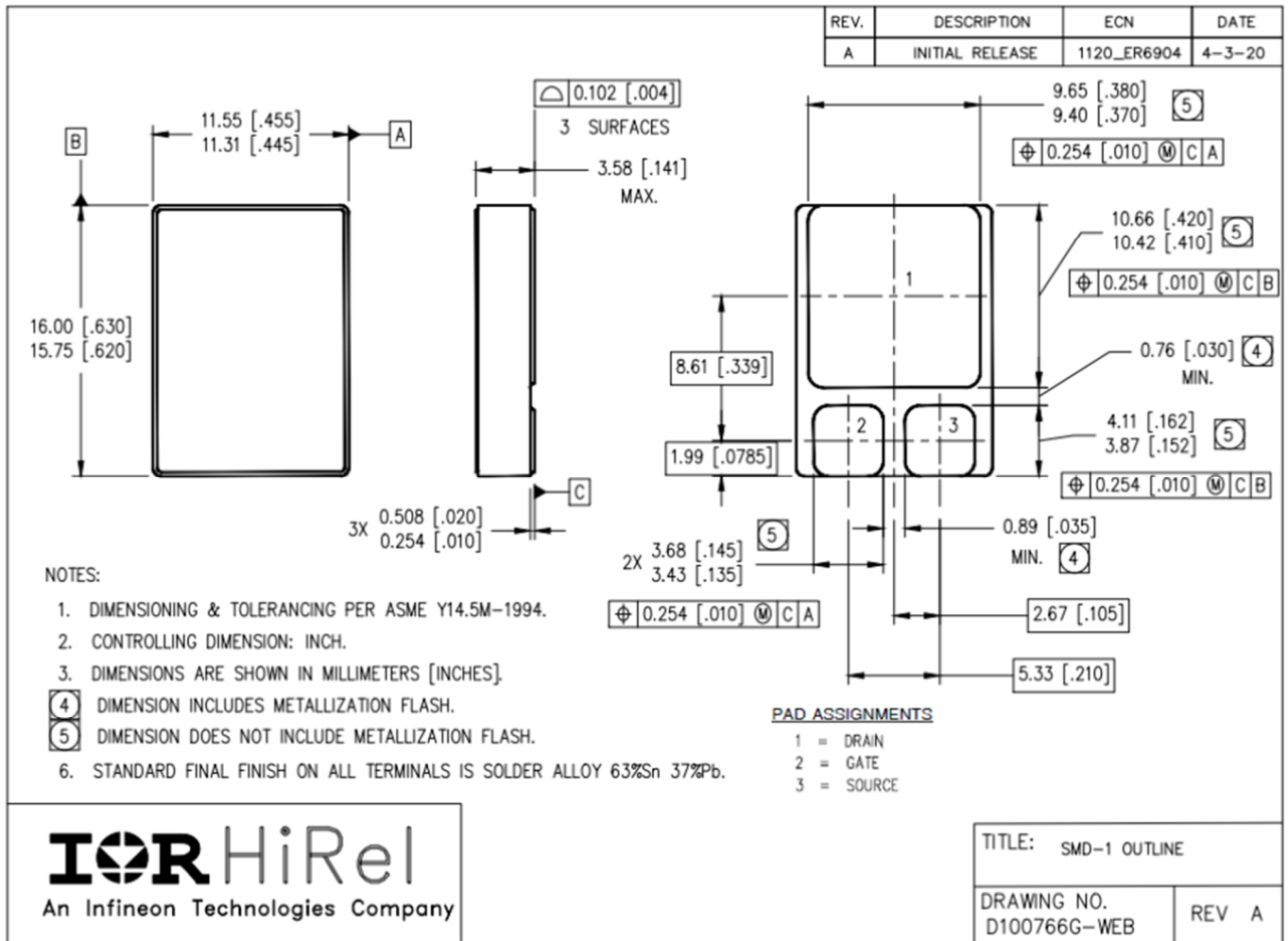
Figure 17 Switching Time Waveforms

IRFN240 (JANTX2N7219U)
Power MOSFET Surface Mount (SMD-1)

Package Outline

5 Package Outline

Note: For the most updated package outline, please see the website: [SMD-1](#)



| | |
|-----------------------------|-------|
| TITLE: SMD-1 OUTLINE | |
| DRAWING NO. D100766G-WEB | REV A |

IRFN240 (JANTX2N7219U)
Power MOSFET Surface Mount (SMD-1)

Revision history

Revision history

| Document version | Date of release | Description of changes |
|-------------------------|------------------------|--|
| Rev B | 01/10/2000 | Datasheet (PD-91548A) |
| Rev C | 01/24/2002 | Added Switchtime test condition $V_{GS}=10V$ |
| Rev D | 12/09/2021 | Updated based on ECN-1120_08867 |

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