

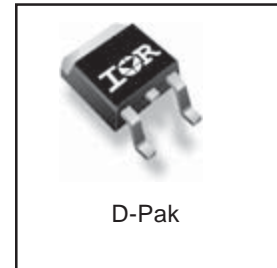
Applications

- High Frequency Synchronous Buck Converters for Computer Processor Power
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use

| | | |
|------------------------|-------------------------------|----------------------|
| V_{DSS} | R_{DS(on)} max | Q_g |
| 30V | 10.5mΩ | 19nC |

Benefits

- Very Low RDS(on) at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current



Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|------------------------|--------------|
| I _D @ T _C = 25°C | Continuous Drain Current, V _{GS} @ 10V | 64 ^④ | A |
| I _D @ T _C = 100°C | Continuous Drain Current, V _{GS} @ 10V | 45 ^④ | |
| I _{DM} | Pulsed Drain Current ^① | 260 | |
| P _D @ T _C = 25°C | Power Dissipation | 71 | W |
| P _D @ T _A = 100°C | Power Dissipation* | 1.5 | |
| | Linear Derating Factor | 0.48 | W/°C |
| V _{GS} | Gate-to-Source Voltage | ±12 | V |
| T _J | Operating Junction and | -55 to +175 | °C |
| T _{STG} | Storage Temperature Range | | |
| | Soldering Temperature, for 10 seconds | 300 (1.6mm from case) | |

Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|------------------|----------------------------------|-------------|-------------|--------------|
| R _{θJC} | Junction-to-Case | — | 2.1 | °C/W |
| R _{θJA} | Junction-to-Ambient (PCB mount)* | — | 50 | |
| R _{θJA} | Junction-to-Ambient | — | 110 | |

Notes ^① through ^④ are on page 9
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IRLR7811W

International
IR Rectifier

Static @ T_J = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---------------------------------------|---|------|------|------|-------|---|
| BV _{DSS} | Drain-to-Source Breakdown Voltage | 30 | — | — | V | V _{GS} = 0V, I _D = 250μA |
| ΔBV _{DSS} /ΔT _J | Breakdown Voltage Temp. Coefficient | — | 27 | — | mV/°C | Reference to 25°C, I _D = 1mA ⑥ |
| R _{DS(on)} | Static Drain-to-Source On-Resistance | — | 6.5 | 10 | mΩ | V _{GS} = 10V, I _D = 15A ④ |
| | | — | 7.5 | 12 | | V _{GS} = 4.5V, I _D = 12A |
| V _{GS(th)} | Gate Threshold Voltage | — | 1.5 | 2.5 | V | V _{DS} = V _{GS} , I _D = 250μA |
| ΔV _{GS(th)} /ΔT _J | Gate Threshold Voltage Coefficient | — | -5.0 | — | mV/°C | |
| I _{DSS} | Drain-to-Source Leakage Current | — | — | 30 | μA | V _{DS} = 24V, V _{GS} = 0V |
| | | — | — | 150 | | V _{DS} = 24V, V _{GS} = 0V, T _J = 125°C |
| I _{GSS} | Gate-to-Source Forward Leakage | — | — | 100 | nA | V _{GS} = 12V |
| | Gate-to-Source Reverse Leakage | — | — | -100 | | V _{GS} = -12V |
| g _{fs} | Forward Transconductance | 58 | — | — | S | V _{DS} = 15V, I _D = 12A |
| Q _g | Total Gate Charge Control Fet | — | 21 | 31 | nC | |
| Q _{gs1} | Pre-V _{th} Gate-Source Charge | — | 5.0 | — | | |
| Q _{gs2} | Post-V _{th} Gate-Source Charge | — | 1.7 | — | | |
| Q _{gd} | Gate-to-Drain Charge | — | 6.6 | — | | |
| Q _{godr} | Gate Charge Overdrive | — | 5.5 | — | | |
| Q _{sw} | Switch Charge (Q _{gs2} + Q _{gd}) | — | 8.3 | — | | |
| Q _g | Total Gate Charge Sync Fet | — | 17 | — | | |
| Q _{oss} | Output Charge | — | 10 | — | | |
| R _g | Gate Resistance | — | 1.6 | — | | |
| t _{d(on)} | Turn-On Delay Time | — | 18 | — | ns | V _{DD} = 16V, V _{GS} = 4.5V ④ I _D = 12A Clamped Inductive Load |
| t _r | Rise Time | — | 4.8 | — | | |
| t _{d(off)} | Turn-Off Delay Time | — | 11 | — | | |
| t _f | Fall Time | — | 23 | — | | |
| C _{iss} | Input Capacitance | — | 2260 | — | pF | V _{GS} = 0V V _{DS} = 15V f = 1.0MHz |
| C _{oss} | Output Capacitance | — | 420 | — | | |
| C _{rss} | Reverse Transfer Capacitance | — | 180 | — | | |

Avalanche Characteristics

| | Parameter | Typ. | Max. | Units |
|-----------------|--------------------------------|------|------|-------|
| E _{AS} | Single Pulse Avalanche Energy② | — | 140 | mJ |
| I _{AR} | Avalanche Current① | — | 12 | A |
| E _{AR} | Repetitive Avalanche Energy① | — | 7.1 | mJ |

Diode Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|-----------------|--|--|------|------|-------|---|
| I _S | Continuous Source Current (Body Diode) | — | — | 64 ④ | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| I _{SM} | Pulsed Source Current (Body Diode) ① | — | — | 260 | | |
| V _{SD} | Diode Forward Voltage | — | — | 1.2 | V | T _J = 25°C, I _S = 12A, V _{GS} = 0V ④ |
| t _{rr} | Reverse Recovery Time | — | 30 | 45 | ns | T _J = 25°C, I _F = 12A |
| Q _{rr} | Reverse Recovery Charge | — | 27 | 41 | nC | di/dt = 100A/μs ④ |
| t _{on} | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D) | | | | |

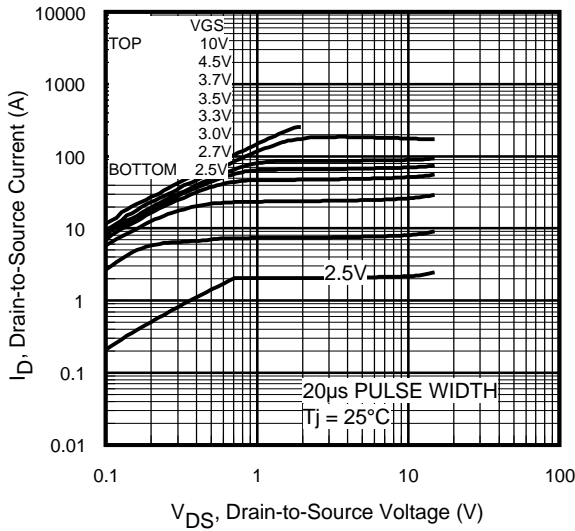


Fig 1. Typical Output Characteristics

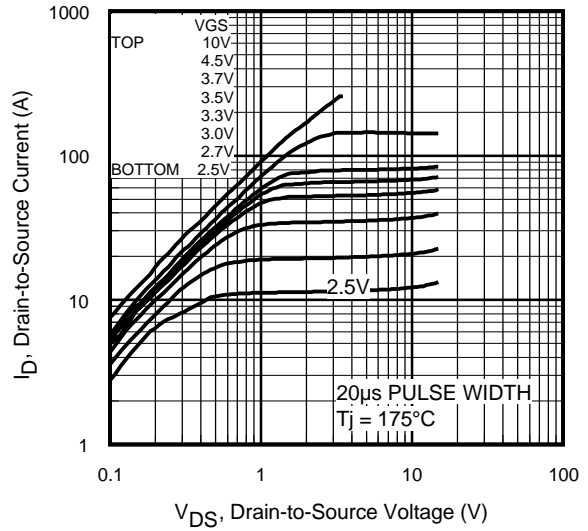


Fig 2. Typical Output Characteristics

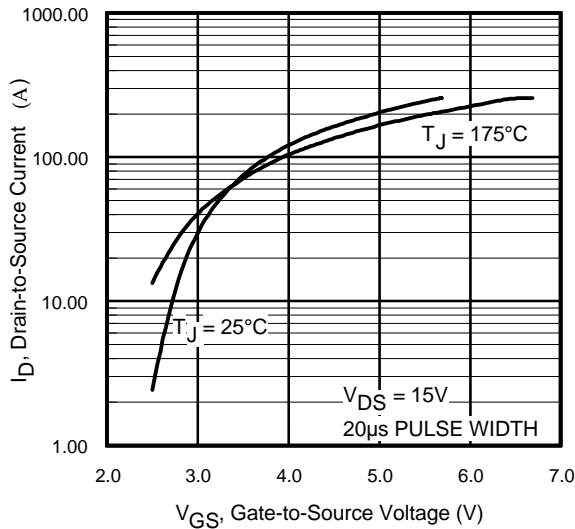


Fig 3. Typical Transfer Characteristics

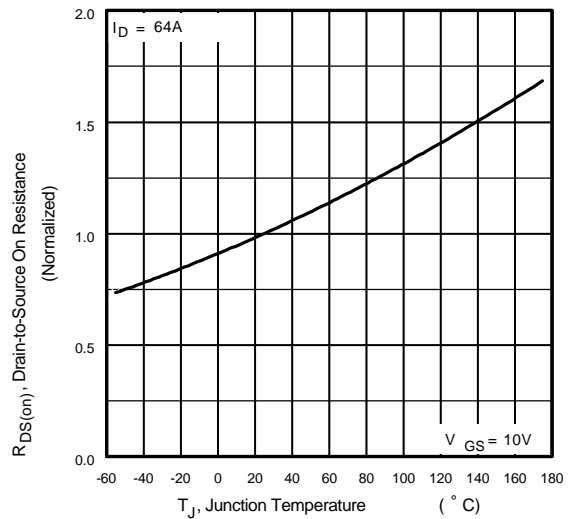


Fig 4. Normalized On-Resistance Vs. Temperature

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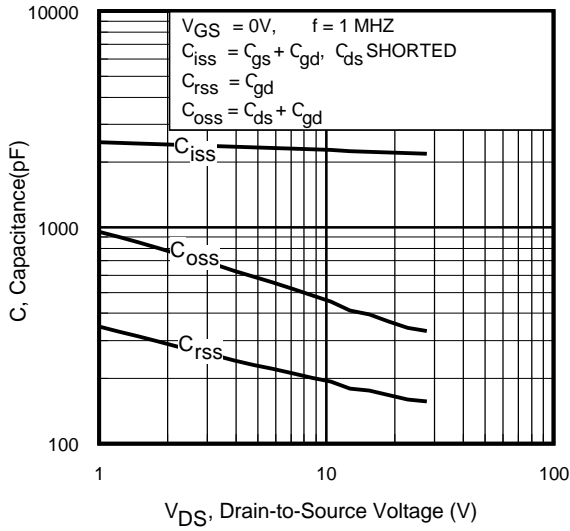


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

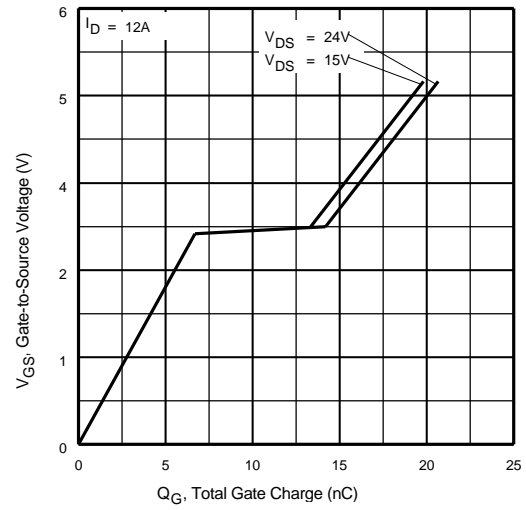


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

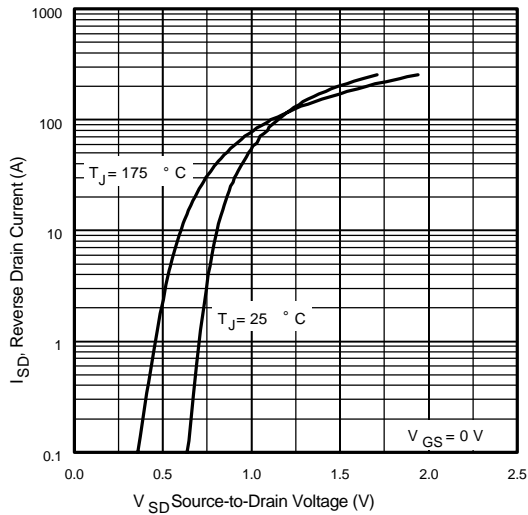


Fig 7. Typical Source-Drain Diode Forward Voltage

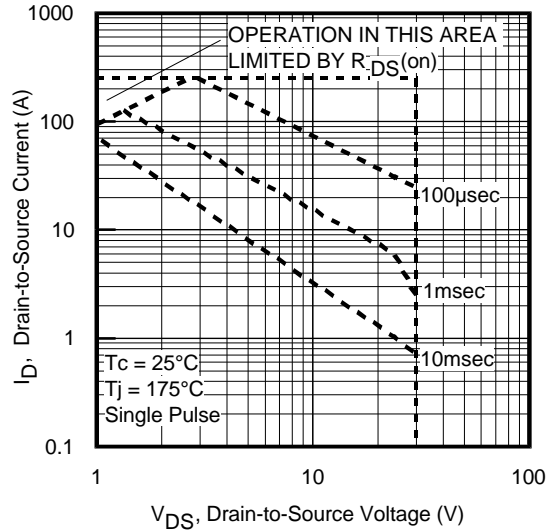


Fig 8. Maximum Safe Operating Area

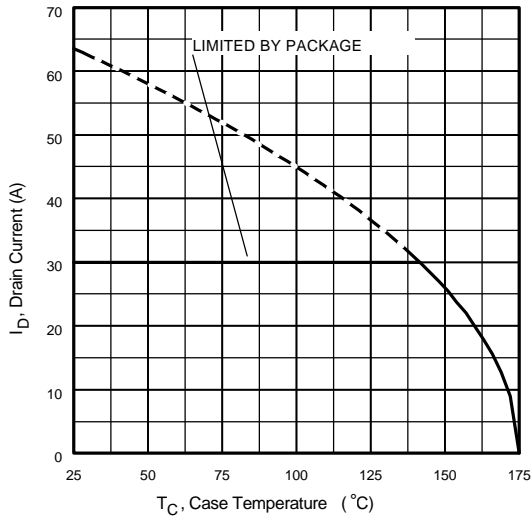


Fig 9. Maximum Drain Current Vs. Case Temperature

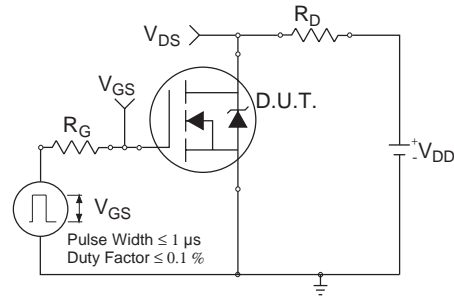


Fig 10a. Switching Time Test Circuit



Fig 10b. Switching Time Waveforms

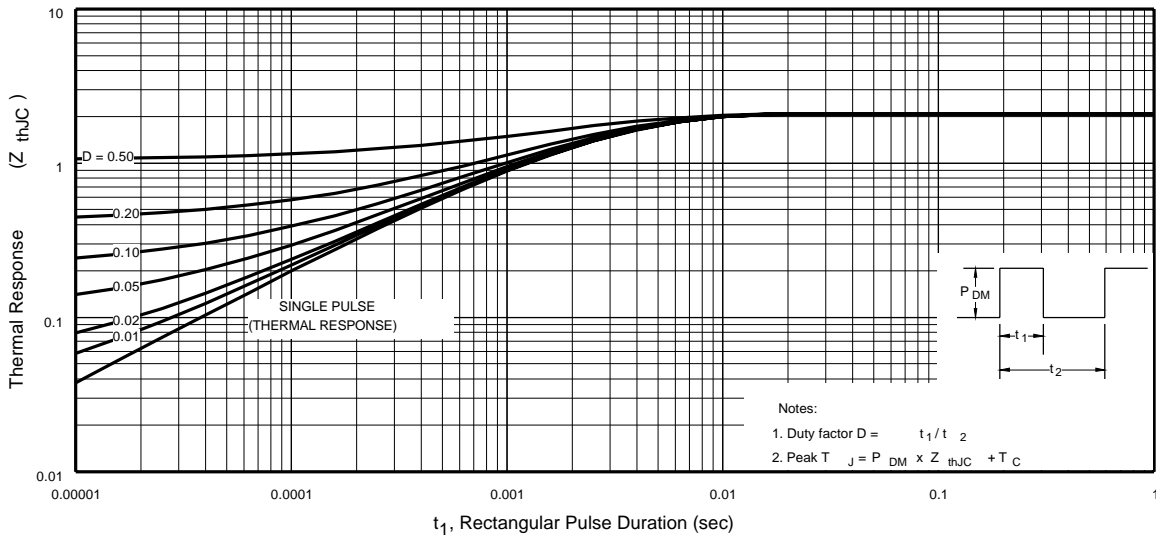


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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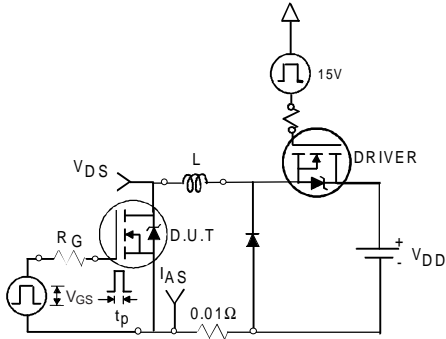


Fig 12a. Unclamped Inductive Test Circuit

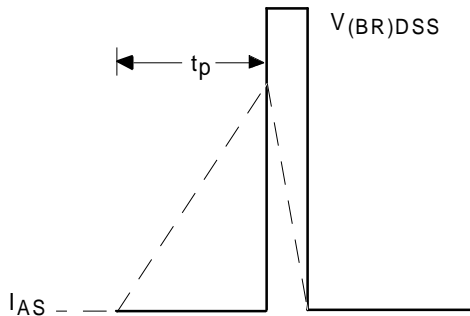


Fig 12b. Unclamped Inductive Waveforms

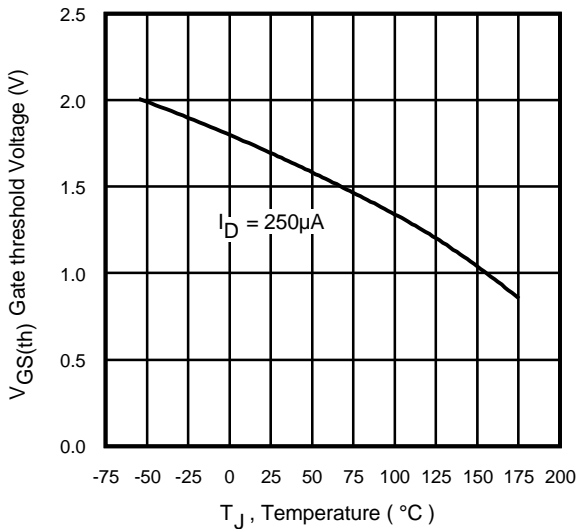


Fig 13. Threshold Voltage Vs. Temperature

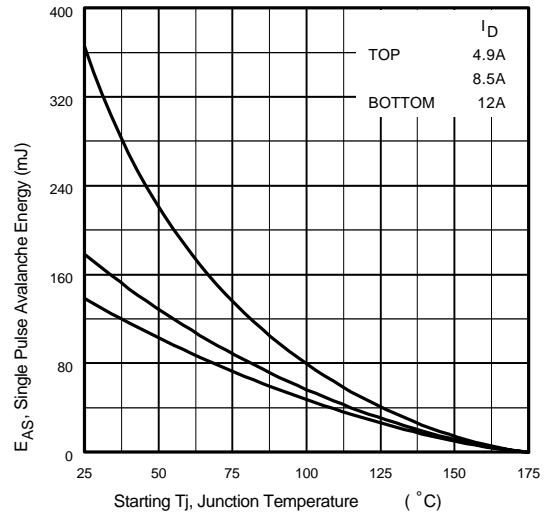


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

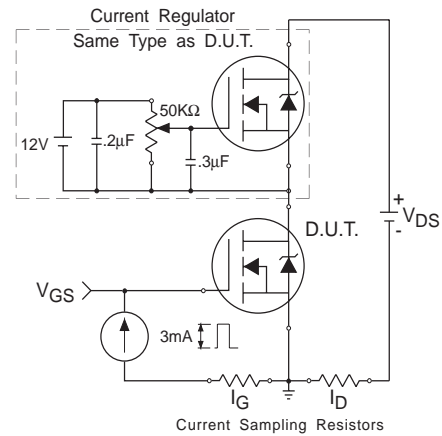
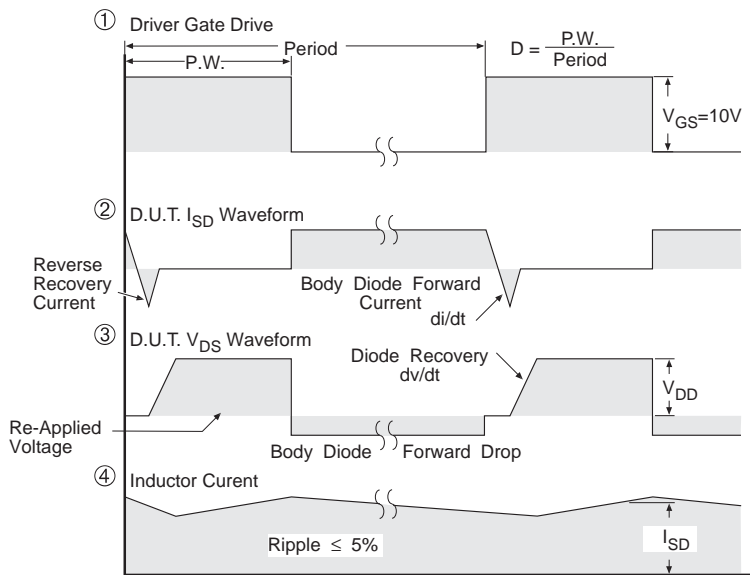
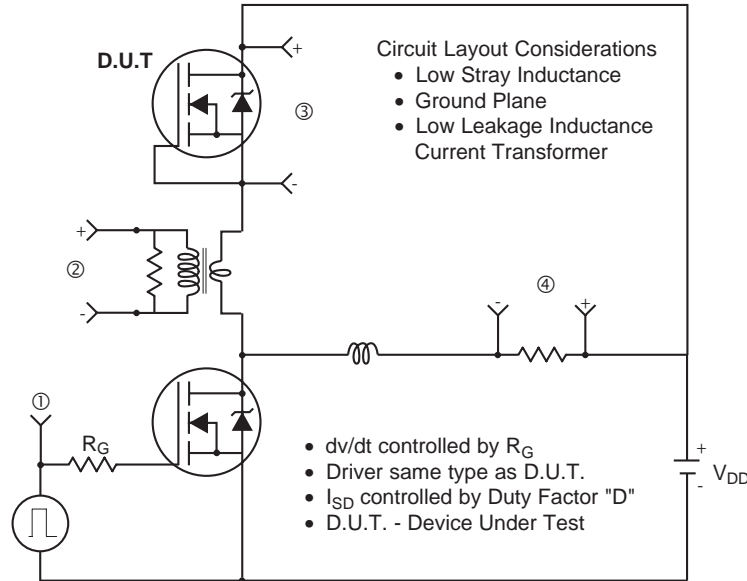


Fig 14. Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



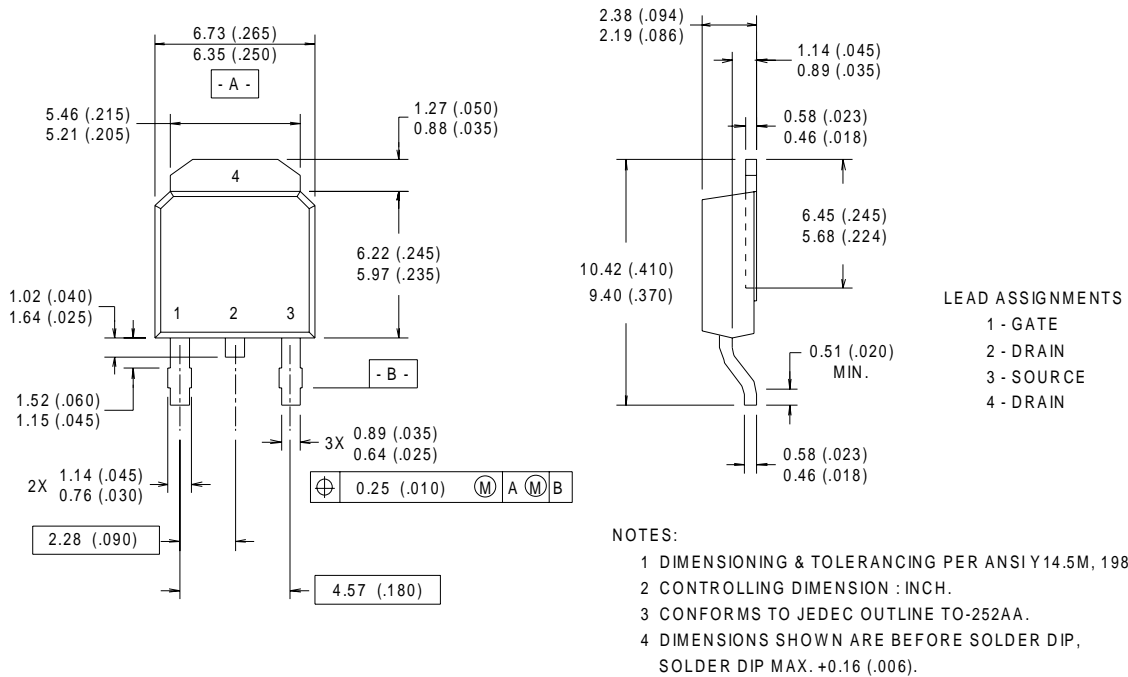
* $V_{GS} = 5V$ for Logic Level Devices

Fig 15. For N-Channel HEXFET® Power MOSFETs

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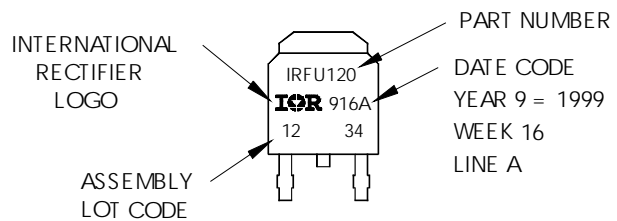
TO-252AA (D-Pak) Package Outline

Dimensions are shown in millimeters (inches)



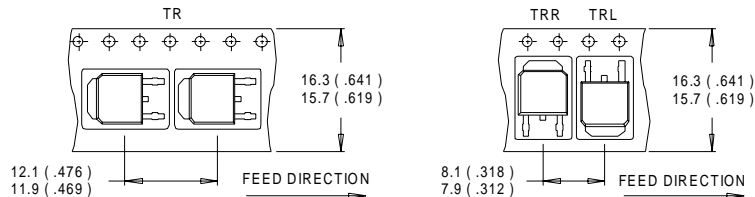
TO-252AA (D-Pak) Part Marking Information

EXAMPLE: THIS IS AN IRFR120
WITH ASSEMBLY
LOT CODE 1234
ASSEMBLED ON WW 16, 1999
IN THE ASSEMBLY LINE "A"

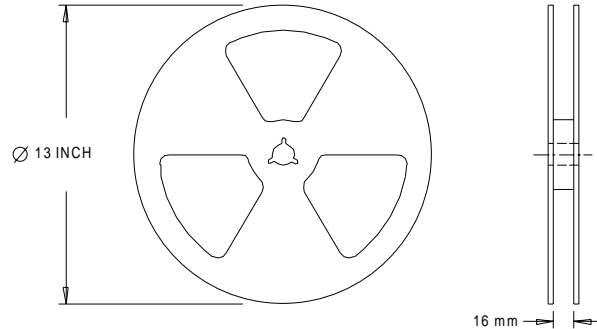


D-Pak (TO-252AA) Tape & Reel Information

Dimensions are shown in millimeters (inches)



- NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
 2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
 3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



- NOTES :
1. OUTLINE CONFORMS TO EIA-481.

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
 - ② Starting $T_J = 25^\circ\text{C}$, $L = 1.9\text{mH}$
 $R_G = 25\Omega$, $I_{AS} = 12\text{A}$.
 - ③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
 - ④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 30A.
- * When mounted on 1" square PCB (FR-4 or G-10 Material).
 For recommended footprint and soldering techniques refer to application note #AN-994.

Data and specifications subject to change without notice.
 This product has been designed and qualified for the Consumer market.
 Qualification Standards can be found on IR's Web site.