PD - 90550D

International
IOR Rectifier

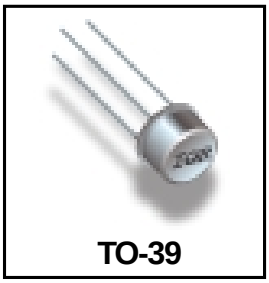
# IRFF9130
# JANTX2N6849
# JANTXV2N6849
# JANS2N6849
# REF:MIL-PRF-19500/564

## REPETITIVE AVALANCHE AND dv/dt RATED HEXFET® TRANSISTORS THRU-HOLE (TO-205AF)

## 100V, P-CHANNEL

### Product Summary

| Part Number | BVDSS | RDS(on) | ID |
|---|---|---|---|
| IRFF9130 | -100V | 0.30Ω | -6.5A |



TO-39

The HEXFET® technology is the key to International Rectifier's advanced line of power MOSFET transistors. The efficient geometry and unique processing of this latest "State of the Art" design achieves: very low on-state resistance combined with high transconductance.

The HEXFET transistors also feature all of the well established advantages of MOSFETs such as voltage control, very fast switching, ease of parelleling and temperature stability of the electrical parameters.

They are well suited for applications such as switching power supplies, motor controls, inverters, choppers, audio amplifiers and high energy pulse circuits.

### Features:

- Repetitive Avalanche Ratings
- Dynamic dv/dt Rating
- Hermetically Sealed
- Simple Drive Requirements
- Ease of Paralleling

## Absolute Maximum Ratings

| | Parameter | | Units |
|---|---|---|---|
| $I_D$ @ $V_{GS}$ = -10V, $T_C$ = 25°C | Continuous Drain Current | -6.5 | A |
| $I_D$ @ $V_{GS}$ = -10V, $T_C$ = 100°C | Continuous Drain Current | -4.1 | |
| $I_{DM}$ | Pulsed Drain Current ① | -25 | |
| $P_D$ @ $T_C$ = 25°C | Max. Power Dissipation | 25 | W |
| | Linear Derating Factor | 0.20 | W/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ±20 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy ② | 92 | mJ |
| $I_{AR}$ | Avalanche Current ① | — | A |
| $E_{AR}$ | Repetitive Avalanche Energy ① | — | mJ |
| dv/dt | Peak Diode Recovery dv/dt ③ | -5.5 | V/ns |
| $T_J$<br>$T_{STG}$ | Operating Junction<br>Storage Temperature Range | -55 to 150 | °C |
| | Lead Temperature | 300 (0.063 in. (1.6mm) from case for 10s) | |
| | Weight | 0.98(typical) | g |

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 | -100 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -1.0mA |
| $\Delta BV_{DSS}/\Delta T_J$ | Temperature Coefficient of Breakdown Voltage | — | -0.10 | — | V/°C | Reference to 25°C, $I_D$ = -1.0mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-State Resistance | — | — | 0.30 | Ω | $V_{GS}$ = -10V, $I_D$ = -4.1A ④ |
| | | — | — | 0.345 | | $V_{GS}$ =-10V, $I_D$ =-6.5A ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | -2.0 | — | -4.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| $g_{fs}$ | Forward Transconductance | 2.5 | — | — | S (℧) | $V_{DS}$ > -15V, $I_{DS}$ = -4.1A ④ |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | — | — | -25 | µA | $V_{DS}$= -80V, $V_{GS}$=0V |
| | | — | — | -250 | | $V_{DS}$ = -80V, $V_{GS}$ = 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 | 14.7 | — | 34.8 | nC | $V_{GS}$ =-10V, ID = -6.5A |
| $Q_{gs}$ | Gate-to-Source Charge | 1.0 | — | 7.1 | | $V_{DS}$= -50V |
| $Q_{gd}$ | Gate-to-Drain ('Miller') Charge | 2.0 | — | 21 | | |
| $t_{d(on)}$ | Turn-On Delay Time | — | — | 60 | ns | $V_{DD}$ = -50V, $I_D$ = -6.5A, |
| $t_r$ | Rise Time | — | — | 140 | | $V_{GS}$ =-10V, $R_G$ =7.5Ω |
| $t_{d(off)}$ | Turn-Off Delay Time | — | — | 140 | | |
| $t_f$ | Fall Time | — | — | 140 | | |
| $L_S + L_D$ | Total Inductance | — | 7.0 | — | nH | Measured from drain lead (6mm/0.25in. from package) to source lead (6mm/0.25in. from package) |
| $C_{iss}$ | Input Capacitance | — | 800 | | pF | $V_{GS}$ = 0V, $V_{DS}$ = -25V |
| $C_{oss}$ | Output Capacitance | — | 350 | — | | f = 1.0MHz |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 125 | — | | |

## Source-Drain Diode Ratings and Characteristics

| | Parameter | Min | Typ | Max | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | -6.5 | A | |
| $I_{SM}$ | Pulse Source Current (Body Diode) ① | — | — | -25 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | -4.7 | V | $T_j$ = 25°C, $I_S$ =-6.5A, $V_{GS}$ = 0V ④ |
| $t_{rr}$ | Reverse Recovery Time | — | — | 250 | nS | $T_j$ = 25°C, $I_F$ = -6.5A, di/dt ≤ -100A/µs |
| $Q_{RR}$ | Reverse Recovery Charge | — | — | 3.0 | µC | $V_{DD}$ ≤ -50V ④ |
| $t_{on}$ | 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 | — | — | 5.0 | °C/W | |
| $R_{thJA}$ | Junction-to-Ambient | — | — | 175 | | Typical socket mount |

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

For footnotes refer to the last page

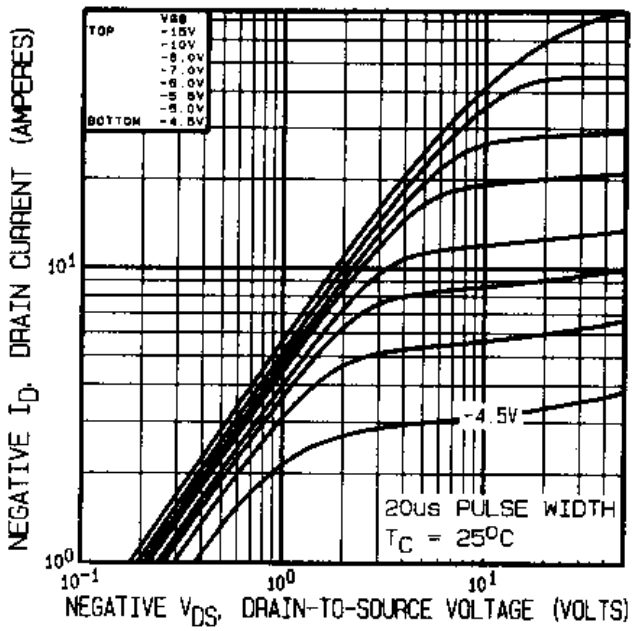



**Fig 1.** Typical Output Characteristics

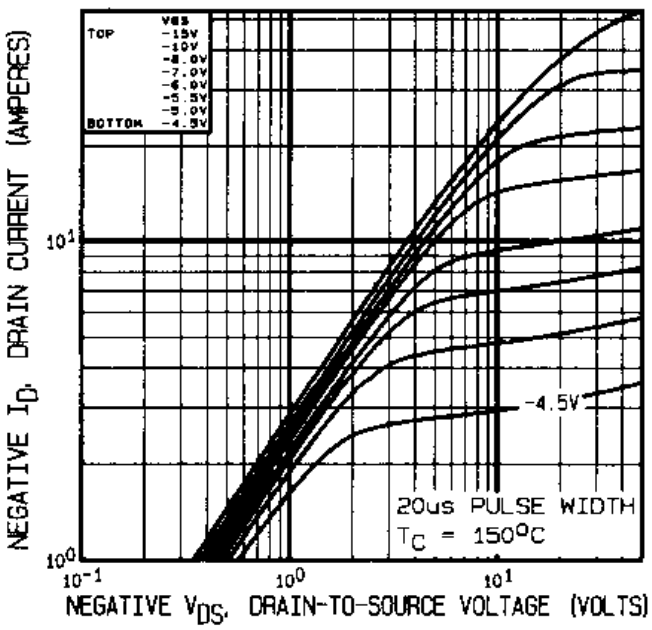



**Fig 2.** Typical Output Characteristics

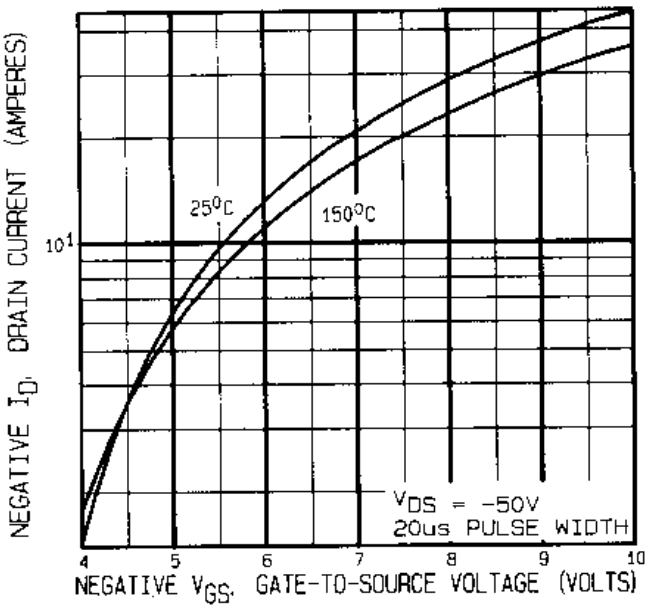



**Fig 3.** Typical Transfer Characteristics

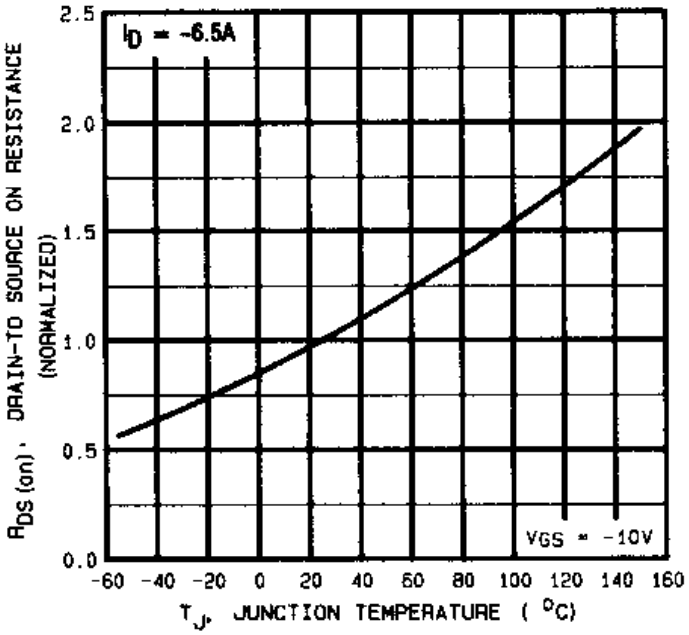



**Fig 4.** Normalized On-Resistance Vs. Temperature

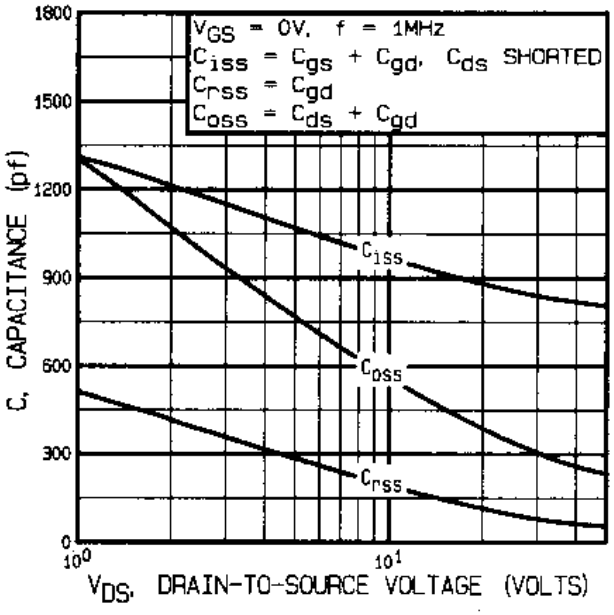



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

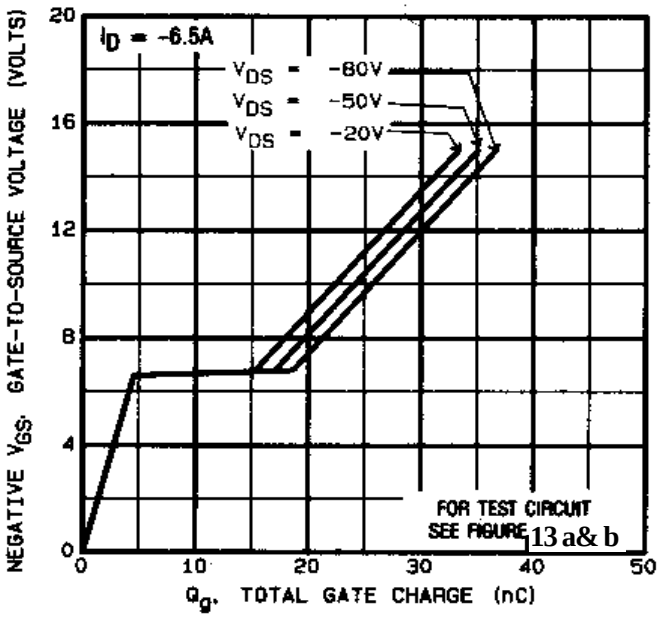



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

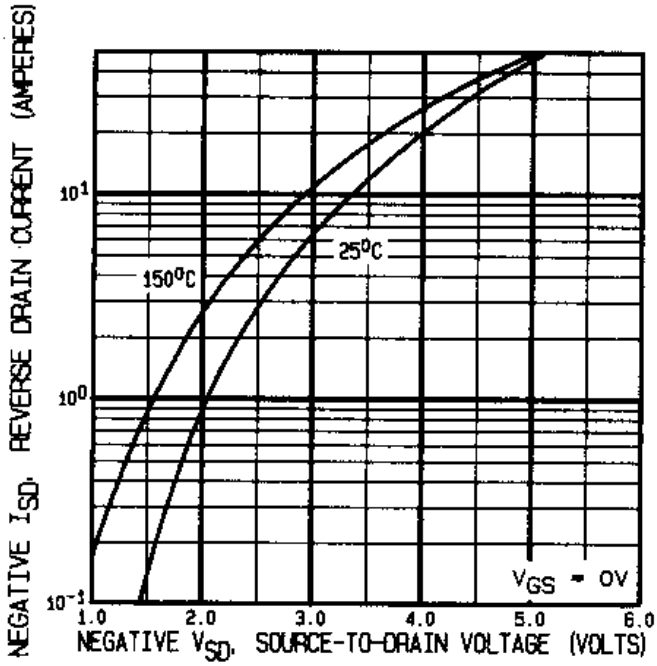



**Fig 7.** Typical Source-Drain Diode Forward Voltage

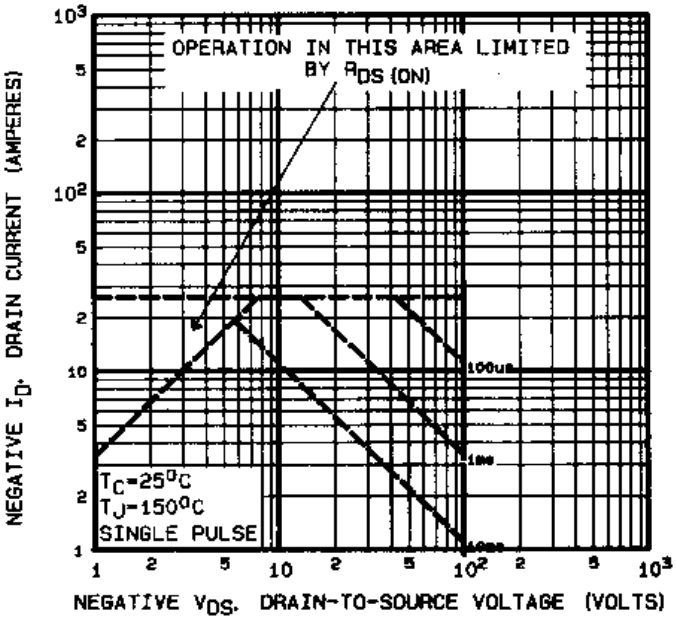



**Fig 8.** Maximum Safe Operating Area

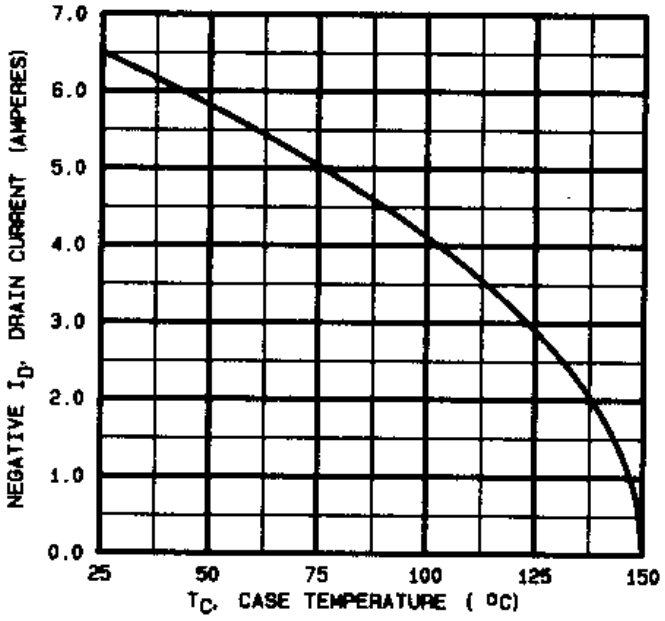



**Fig 9.** Maximum Drain Current Vs. Case Temperature

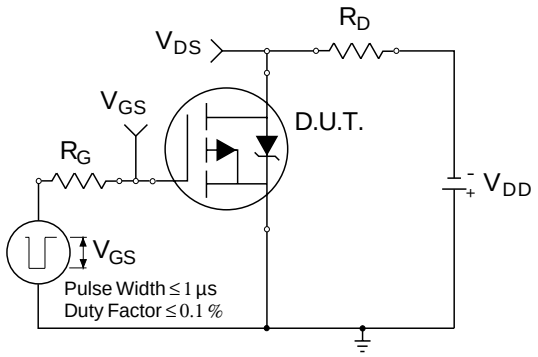



**Fig 10a.** Switching Time Test Circuit

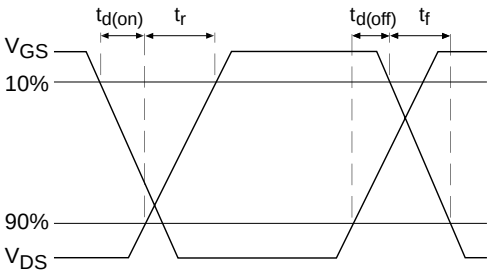



**Fig 10b.** Switching Time Waveforms

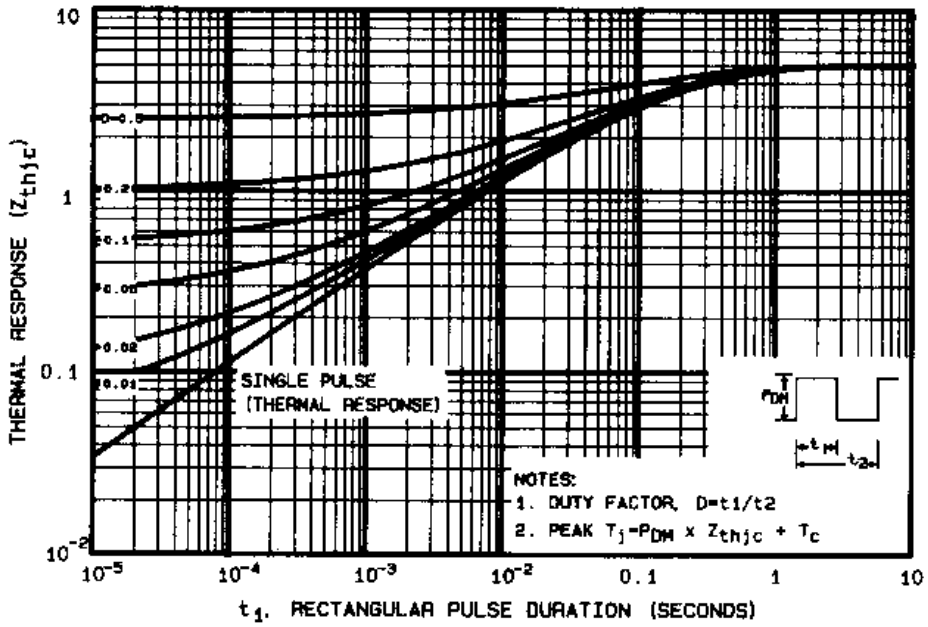



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

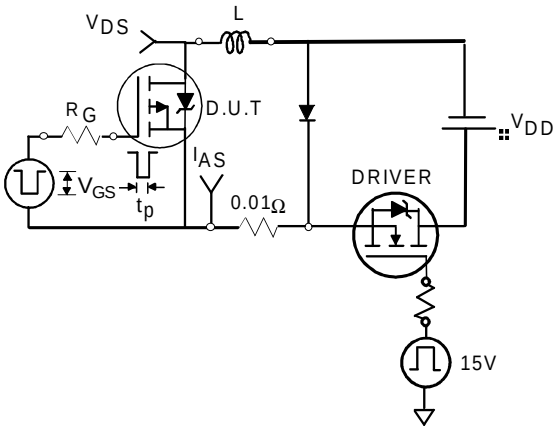



**Fig 12a.** Unclamped Inductive Test Circuit

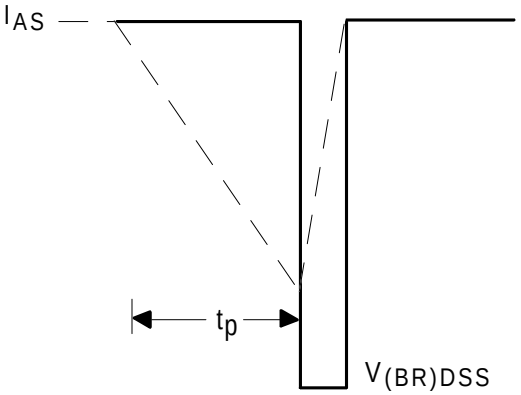



**Fig 12b.** Unclamped Inductive Waveforms

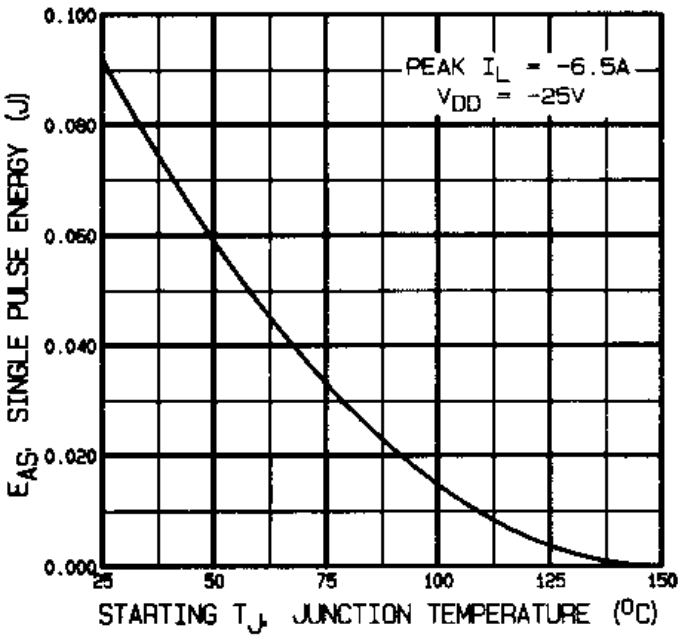



**Fig 12c.** Maximum Avalanche Energy Vs. Drain Current

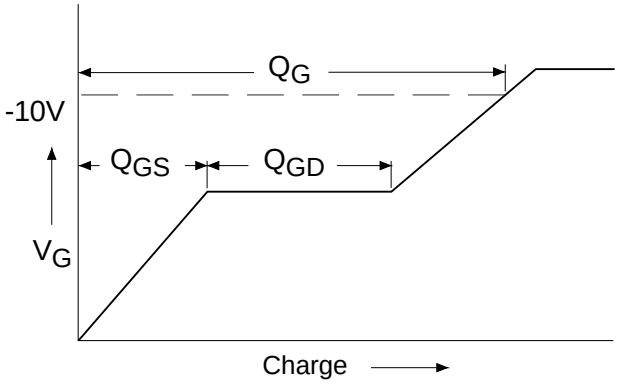



**Fig 13a.** Basic Gate Charge Waveform

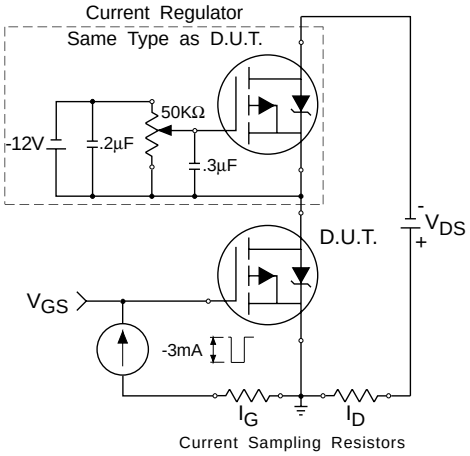



**Fig 13b.** Gate Charge Test Circuit

## Foot Notes:

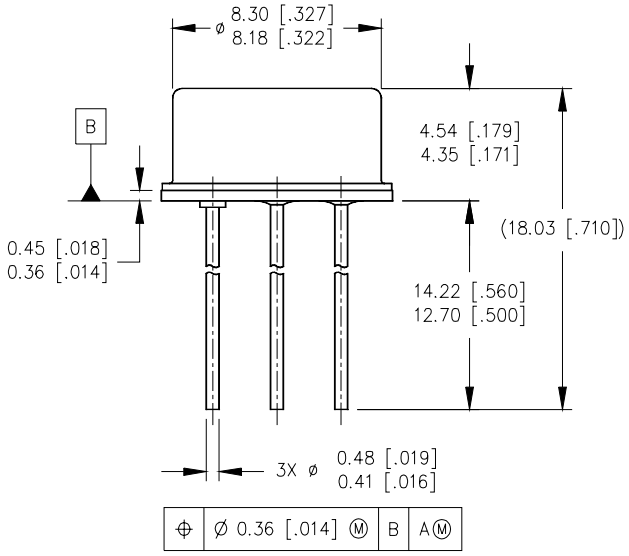
① Repetitive Rating; Pulse width limited by maximum junction temperature.

② $V_{DD}$ = -25V, starting $T_J$ = 25°C, Peak $I_L$ = -6.5A, $V_{GS}$ = -10V

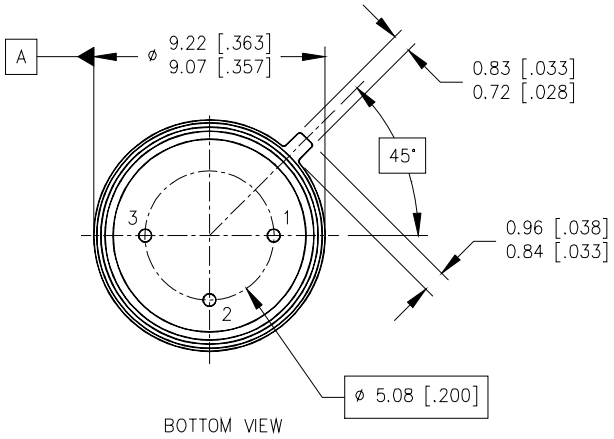
③ $I_{SD} \leq$ -6.5A, di/dt ≤ -140A/µs, $V_{DD} \leq$ -100V, $T_J \leq$ 150°C
Suggested RG = 7.5 Ω

④ Pulse width ≤ 300 µs; Duty Cycle ≤ 2%

## Case Outline and Dimensions —TO-205AF




SIDE VIEW




BOTTOM VIEW

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME 14.5M–1994.
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. CONTROLLING DIMENSION: INCH.
4. CONFORMS TO JEDEC OUTLINE TO–205AF (TO–39).

LEGEND
1- SOURCE
2- GATE
3- DRAIN

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