## Electrical Characteristics @ Tj = 25°C (Unless Otherwise Specified)

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-to-Source Breakdown Voltage | -100 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -1.0mA |
| $\Delta BV_{DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | -0.10 | — | V/°C | Reference to 25°C, $I_D$ = -1.0mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 0.30 | Ω | $V_{GS}$ = -10V, $I_{D2}$ = -4.1A ④ |
| | | — | — | 0.320 | | $V_{GS}$ = -10V, $I_{D1}$ = -6.5A ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | -2.0 | — | -4.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250µA |
| $I_{DSS}$ | 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 |
| | Gate-to-Source Leakage Reverse | — | — | 100 | | $V_{GS}$ = 20V |
| $Q_G$ | Total Gate Charge | 14.7 | — | 34.8 | nC | $I_{D1}$ = -6.5A |
| $Q_{GS}$ | Gate-to-Source Charge | 1.0 | — | 6.8 | | $V_{DS}$ = -50V |
| $Q_{GD}$ | Gate-to-Drain ('Miller') Charge | 2.0 | — | 23.1 | | $V_{GS}$ = -10V |
| $t_{d(on)}$ | Turn-On Delay Time | — | — | 60 | ns | $V_{DD}$ = -40V |
| tr | Rise Time | — | — | 140 | | $I_{D1}$ = -6.5A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | — | 140 | | $R_G$ = 7.5Ω |
| $t_f$ | Fall Time | — | — | 140 | | $V_{GS}$ = -10V |
| Ls +$L_D$ | Total Inductance | — | 7.0 | — | nH | Measured from Drain lead (6mm / 0.25 in from package) to Source lead (6mm/ 0.25 in from package) with Source wire internally bonded from Source pin to Drain pin |
| $C_{iss}$ | Input Capacitance | — | 800 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 350 | — | | $V_{DS}$ = -25V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 125 | — | | $f$ = 1.0MHz |

## Source-Drain Diode Ratings and Characteristics

| Symbol | Parameter | Min. | Typ. | Max. | Units | Test Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | -6.5 | A | |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | -25 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | -4.3 | V | $T_J$ = 25°C,$I_S$ = -6.5A, $V_{GS}$ = 0V④ |
| $t_{rr}$ | Reverse Recovery Time | — | — | 250 | ns | $T_J$ = 25°C, $I_F$ = -6.5A, $V_{DD}$ ≤ -50V |
| $Q_{rr}$ | Reverse Recovery Charge | — | — | 3.0 | µC | di/dt = -100A/µs ④ |
| $t_{on}$ | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$+$L_D$) | | | | |

## Thermal Resistance

| Symbol | Parameter | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-Case | — | — | 5.0 | °C/W |
| $R_{\theta JA}$ | Junction-to-Ambient (Typical Socket Mount) | — | — | 175 | |

**Footnotes:**

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

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

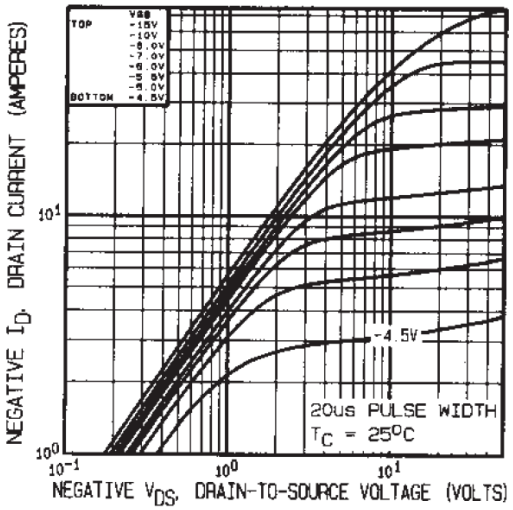



**Fig 1.** Typical Output Characteristics

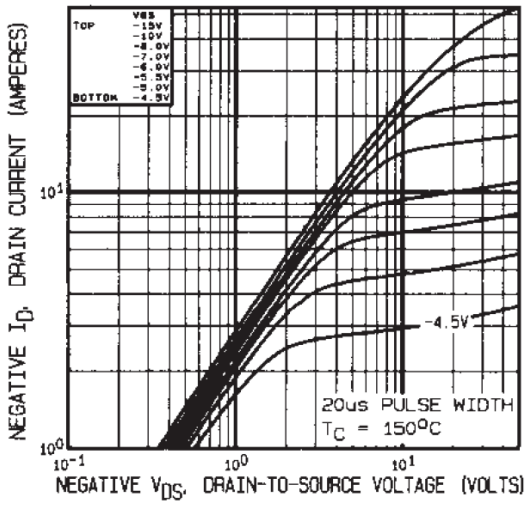



**Fig 2.** Typical Output Characteristics

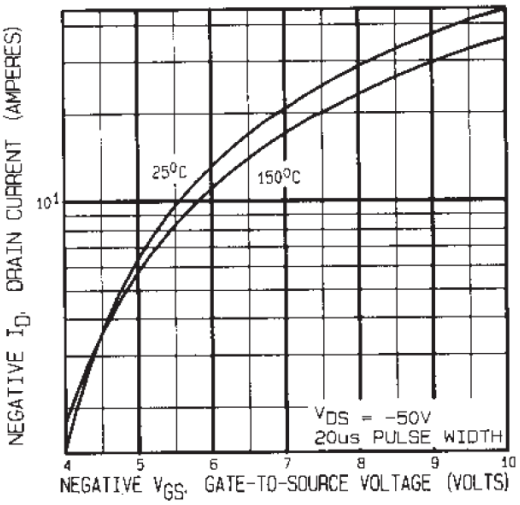



**Fig 3.** Typical Transfer Characteristics

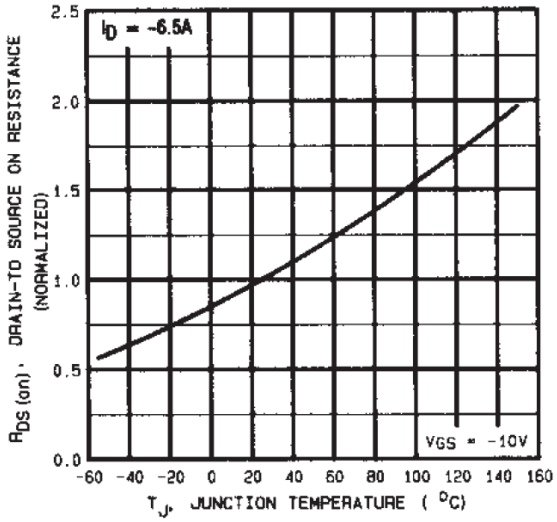



**Fig 4.** Normalized On-Resistance Vs. Temperature

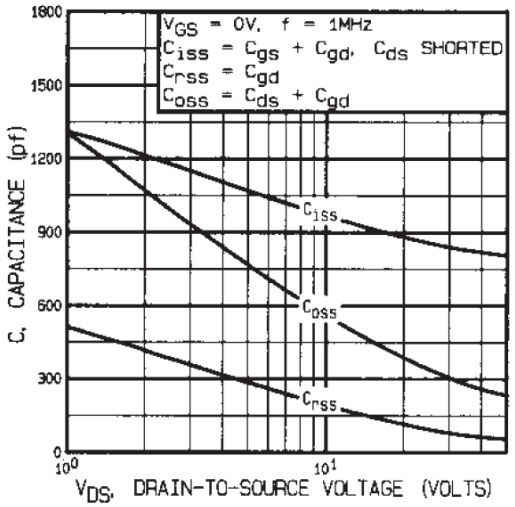



**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage

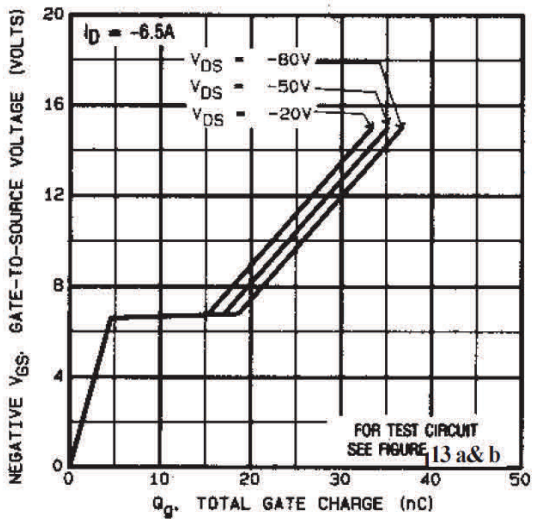



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage

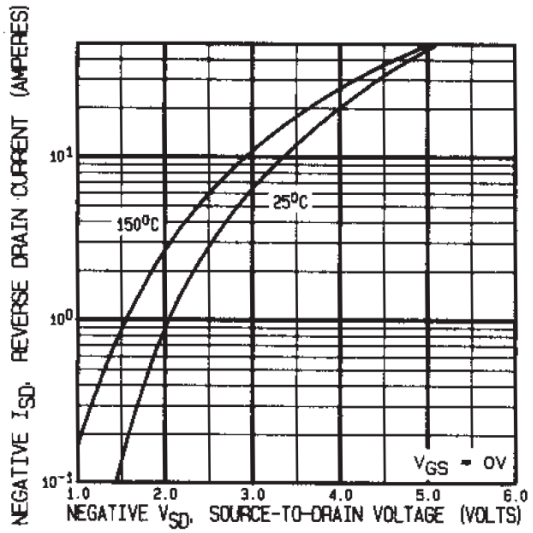



**Fig 7.** Typical Source-Drain Diode Forward Voltage

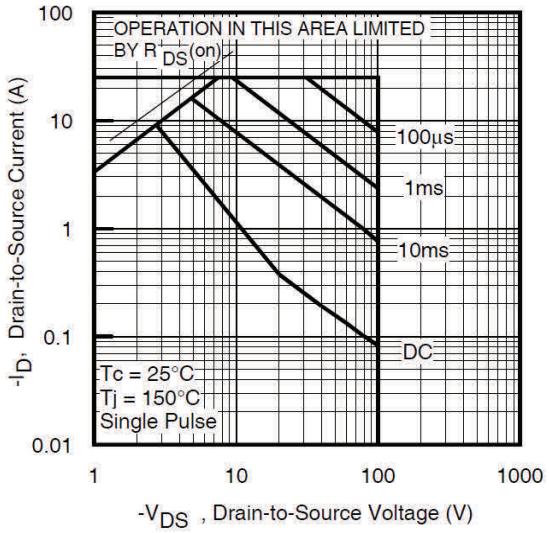



**Fig 8.** Maximum Safe Operating Area

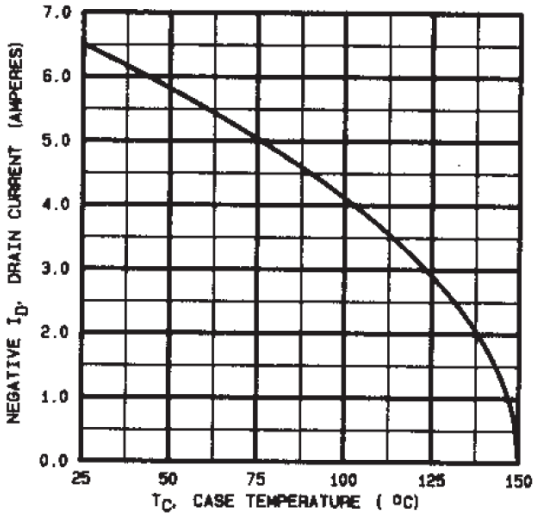



**Fig 9.** Maximum Drain Current Vs. Case Temperature

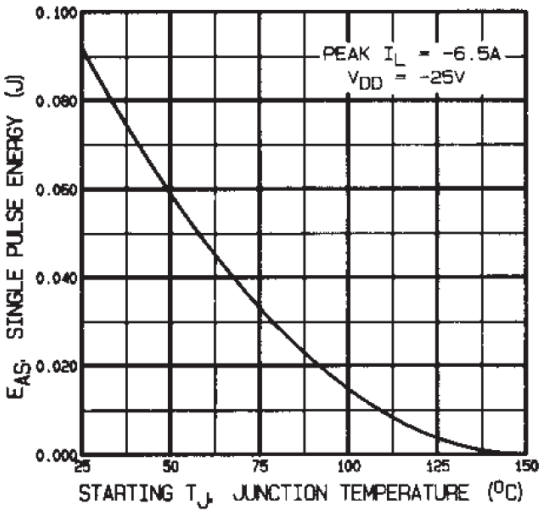



**Fig 10.** Maximum Avalanche Energy Vs. Drain Current

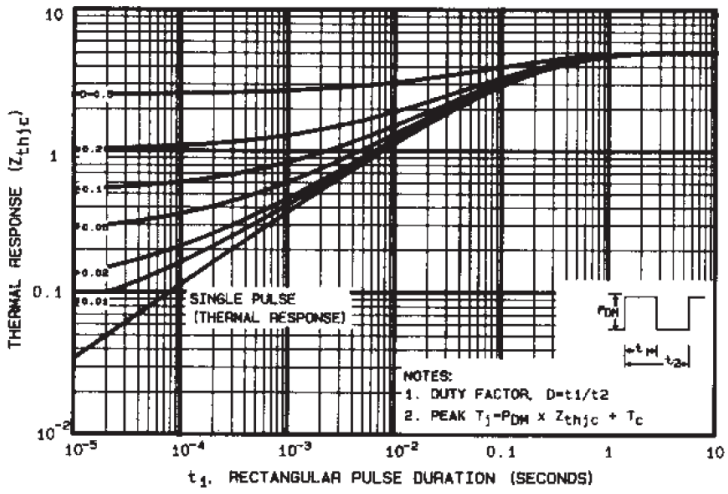



**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

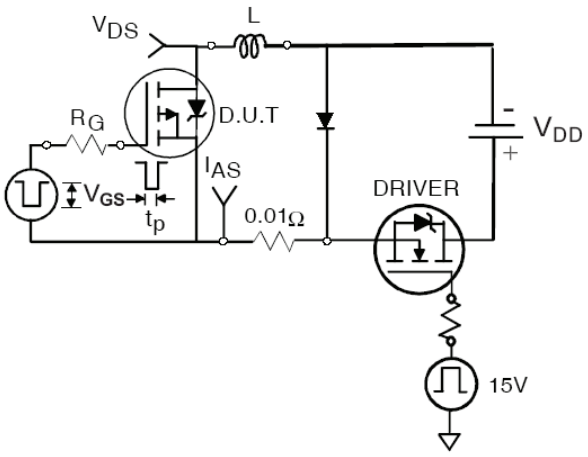



**Fig 12a.** Unclamped Inductive Test Circuit

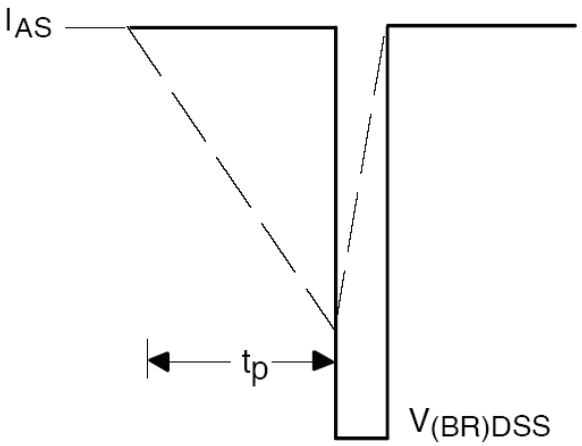



**Fig 12b.** Unclamped Inductive Waveforms

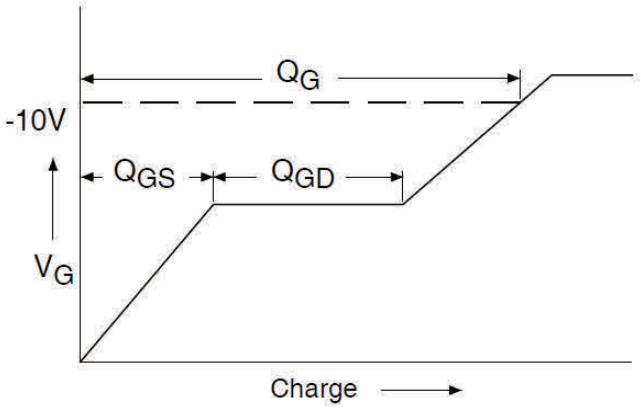



**Fig 13a.** Gate Charge Waveform

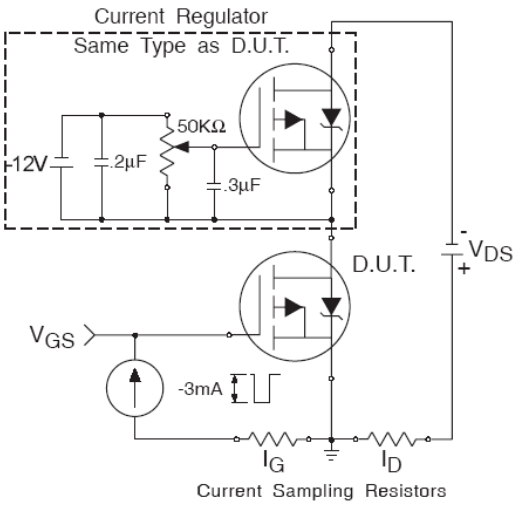



**Fig 13b.** Gate Charge Test Circuit

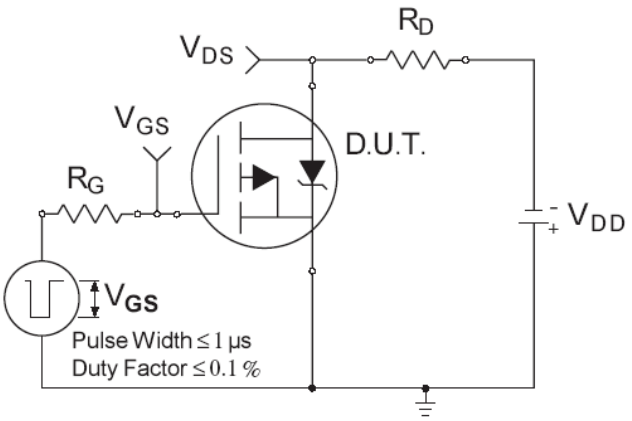



**Fig 14a.** Switching Time Test Circuit

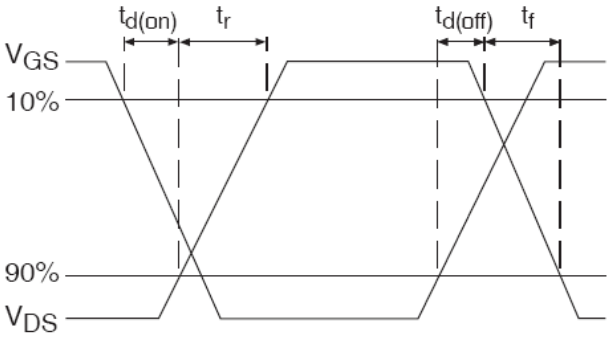
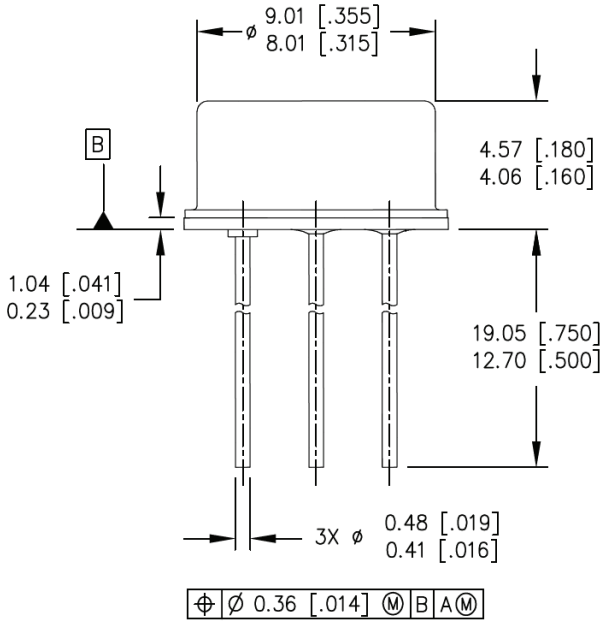
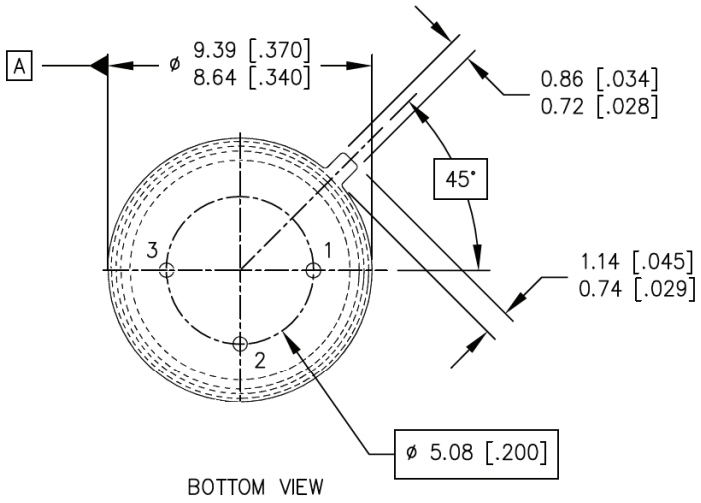



**Fig 14b.** Switching Time Waveforms

## Case Outline and Dimensions - TO-205AF (TO-39)




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 (CONNECTED TO THE CASE)



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