FAIRCHILD SEMICONDUCTOR™

# 2N6897

## -12A, -100V, P-Channel Enhancement Mode Power MOS Field Effect Transistor

January 1997

### Features

- **-12A, -100V**
- **$r_{DS(ON)} = 0.3\Omega$**
- **SOA is Power Dissipation Limited**
- **Nanosecond Switching Speeds**
- **Linear Transfer Characteristics**
- **High Input Impedance**
- **Majority Carrier Device**

### Ordering Information

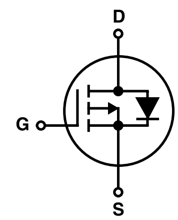
| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| 2N6897 | TO-204AA | 2N6897 |

NOTE: When ordering, include the entire part number.

### Description

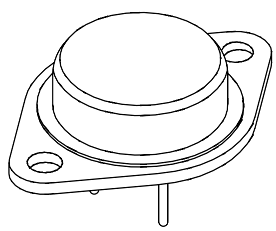
The 2N6897 is an P-Channel enhancement mode silicon gate power MOS field effect transistor designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high power bipolar switching transistors requiring high speed and low gate drive power. This device can be operated directly from an integrated circuit.

### Symbol




### Packaging

**JEDEC TO-204AA**



## Absolute Maximum Ratings    $T_C = 25^oC$, Unless Otherwise Specified

| | | 2N6897 | UNITS |
|---|---|---|---|
| Drian to Source Voltage | $BV_{DSS}$ | -100 | V |
| Drian to Gate Voltage ($R_{GS} = 1M\Omega$) | $V_{DGR}$ | -100 | V |
| Continuous Drain Current | | | |
| RMS Continuous | $I_D$ | -12 | A |
| Pulsed Drain Current | $I_{DM}$ | -30 | A |
| Gate to Source Voltage | $V_{GS}$ | ±20 | V |
| Maximum Power Dissipation | | | |
| $T_C = 25^oC$ | $P_D$ | 100 | W |
| Above $T_C = 25^oC$, Derate Linearly | | 0.8 | $W/^oC$ |
| Operating and Storage Junction Temperature Range | $T_J, T_{STG}$ | -55 to 150 | $^oC$ |
| Maximum Lead Temperature for Soldering (At distance 1/8 in. (3.17mm) from seating plane for 10s max) | $T_L$ | 260 | $^oC$ |

*CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.*

## Electrical Specifications    $T_C = 25^oC$, Unless Otherwise Specified

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Drian to Source Breakdown Voltage | $BV_{DSS}$ | $I_D = 1mA$, $V_{GS} = 0V$ | -100 | - | - | V |
| Gate to Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}$, $I_D = 0.25mA$ | -2 | - | -4 | V |
| Zero-Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS} = -80V$ | - | - | 1 | µA |
| Zero-Gate Voltage Drain Current $T_C = 125^oC$ | | $V_{DS} = -80V$ | - | - | 50 | µA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS} = ±20V$, $V_{DS} = 0V$ | - | - | 100 | nA |
| Drian to Source On-Voltage (Note 1) | $V_{DS(ON)}$ | $I_D = 7.6A$, $V_{GS} = -10V$ | - | - | 2.28 | V |
| | | $I_D = 12A$, $V_{GS} = -10V$ | - | - | -4.8 | V |
| Static Drian to Source On Resistance (Note 1) | $r_{DS(ON)}$ | $I_D = 7.6A$, $V_{GS} = -10V$ | - | - | 0.3 | Ω |
| Static Drian to Source On Resistance $T_C = 125^oC$ (Note 1) | | $I_D = 7.6A$, $V_{GS} = 10V$ | - | - | 0.465 | Ω |
| Forward Transconductance (Note 1) | $g_{fs}$ | $I_D = 7.6A$, $V_{DS} = -10V$ | 2 | - | 8 | S |
| Input Capacitance | $C_{ISS}$ | $V_{GS} = 0V$, $V_{DS} = -25V$ f = 0.1MHz | 400 | - | 1500 | pF |
| Output Capacitance | $C_{OSS}$ | | 200 | - | 700 | pF |
| Reverse-Transfer Capacitance | $C_{RSS}$ | | 60 | - | 240 | pF |
| Turn-On Delay Time | $t_{d(ON)}$ | $I_D = 7.6A$, $V_{DS} = -50V$ $R_{GEN} = R_{GS} = 15\Omega$, $V_{GS} = -10V$ | - | - | 60 | ns |
| Rise Time | $t_r$ | | - | - | 175 | ns |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | - | - | 275 | ns |
| Fall Time | $t_f$ | | - | - | 175 | ns |
| Thermal Resistance Junction-to-Case | $R_{\theta JC}$ | | - | - | 1.25 | $^oC/W$ |

## Source to Drain Diode Specifications

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Diode Forward Voltage (Note 1) | $V_{SD}$ | $I_{SD} = 12A$ | 0.8 | - | 1.6 | V |
| Diode Reverse Recovery Time | $t_{rr}$ | $I_F = 4A$, $d_{IF}/dt = 100A/\mu s$ | - | - | 500 | ns |

NOTE:

4. Pulsed: pulse duration = 300µs, max, duty cycle = 2%.

## *Typical Performance Curves* Unless Otherwise Specified

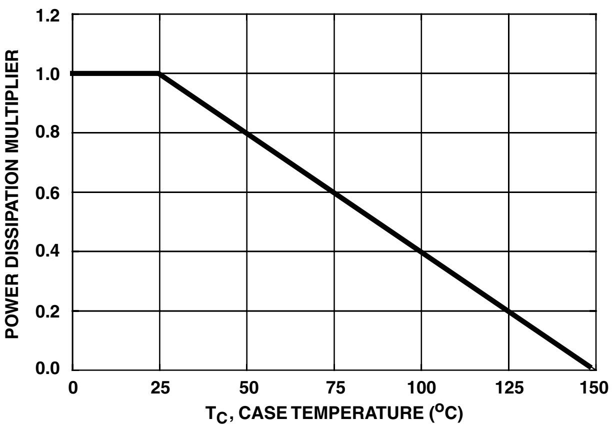



FIGURE 15. NORMALIZED POWER DISSIPATION vs TEMPERATURE DERATING CURVE

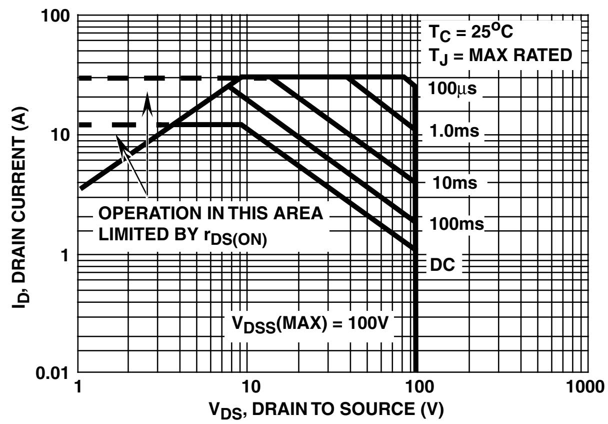



FIGURE 16. MAXIMUM OPERATING AREAS CURVE

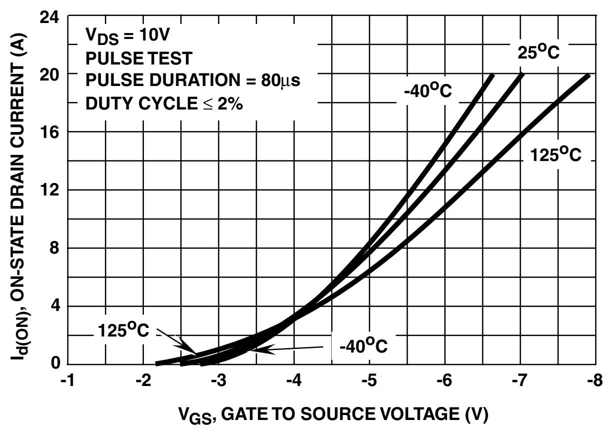



FIGURE 17. TRANSFER CHARACTERISTICS

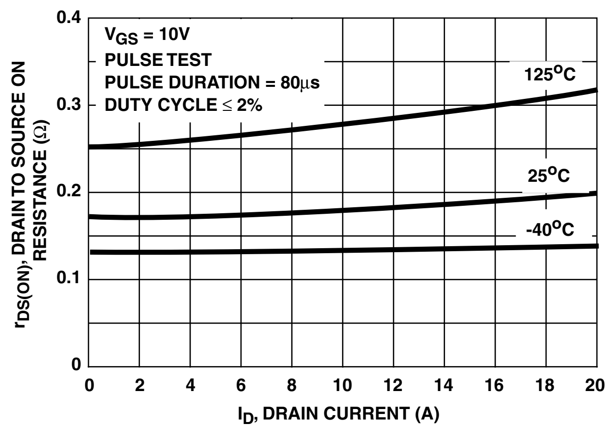



FIGURE 18. DRAIN TO SOURCE ON RESISTANCE AS A FUNCTION OF DRAIN CURRENT

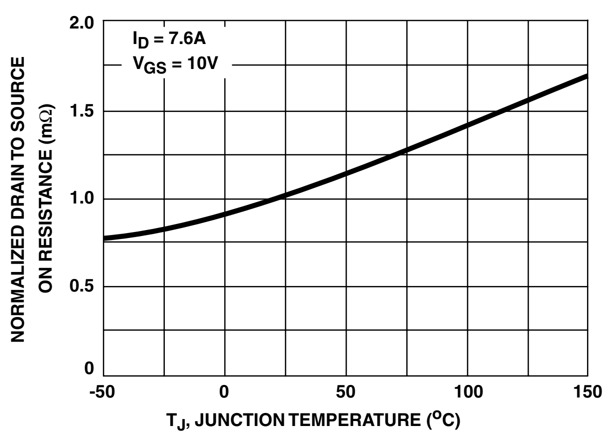



FIGURE 19. NORMALIZED $r_{DS(ON)}$ vs JUNCTION TEMPERATURE

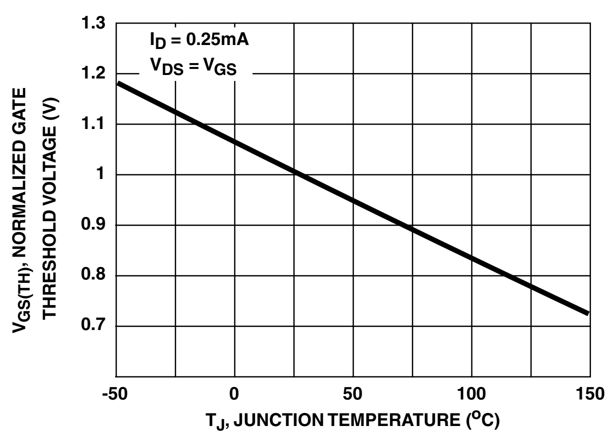



FIGURE 20. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

## *Typical Performance Curves* Unless Otherwise Specified **(Continued)**

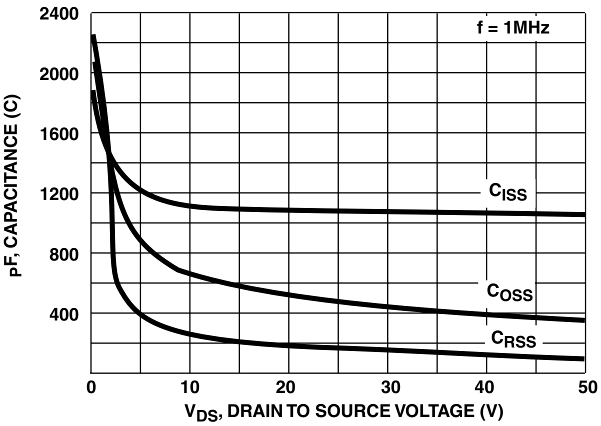



**FIGURE 21. CAPACITANCE vs VOLTAGE**

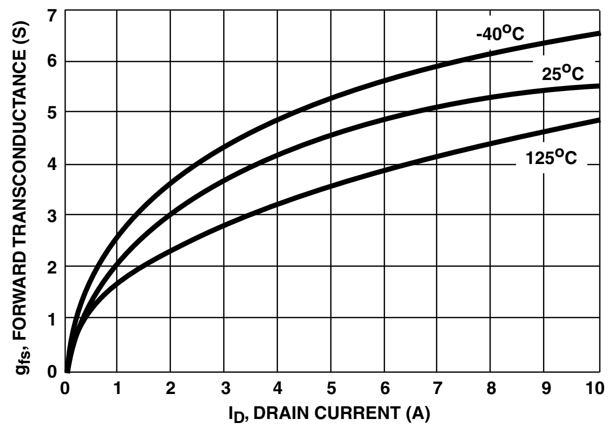



**FIGURE 22. FORWARD TRANSCONDUCTANCE AS A FUNCTION OF DRAIN CURRENT**

## *Test Circuit and Waveforms*

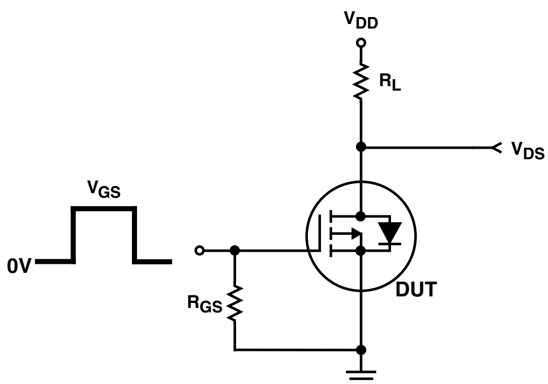



**FIGURE 23. RESISTIVE SWITCHING TEST CIRCUIT**

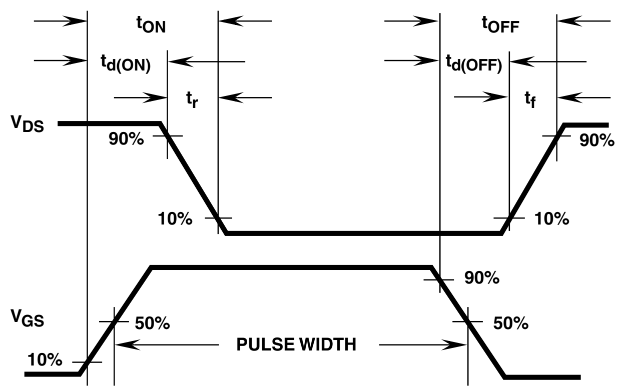



**FIGURE 24. RESISTIVE SWITCHING WAVEFORMS**

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MicroFET™
MICROWIRE™
OPTOLOGIC™
OPTOPLANAR™
PACMAN™
POP™
PowerTrench ®
QFET™
QS™
QT Optoelectronics™
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|---|---|---|
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