

**2N6904**

**N-Channel Logic Level Power MOS  
 Field-Effect Transistors (L<sup>2</sup> FET)**

8 A, 200 V  
 $r_{DS(on)}$ : 0.6  $\Omega$

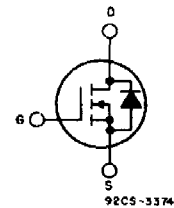
**Features:**

- Design optimized for 5 volt gate drive
- Can be driven directly from Q-MOS, N-MOS, TTL Circuits
- Compatible with automotive drive requirements
- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device

The 2N6904 is an n-channel enhancement-mode silicon-gate power MOS field-effect transistor specifically designed for use with logic level (5 volt) driving sources in applications such as programmable controllers, automotive switching, and solenoid drivers. This performance is accomplished through a special gate oxide design which provides full rated conduction at gate biases in the 3-5 volt range, thereby facilitating true on-off power control directly from logic circuit supply voltages.

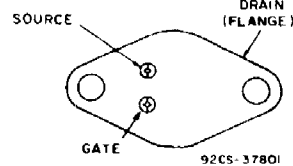
The 2N6904 is supplied in the JEDEC TO-204AA steel package.

**N-CHANNEL ENHANCEMENT MODE**



**TERMINAL DIAGRAM**

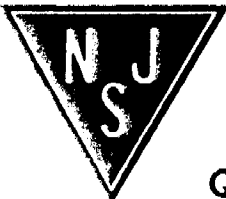
**TERMINAL DESIGNATION**



**JEDEC TO-204AA**

**MAXIMUM RATINGS, Absolute Maximum Values (T<sub>c</sub> = 25° C):**

* DRAIN-SOURCE VOLTAGE, V <sub>DSS</sub> .....	200 V
* DRAIN-GATE VOLTAGE (R <sub>DS</sub> = 1 M $\Omega$ ), V <sub>DGN</sub> .....	200 V
* GATE-SOURCE VOLTAGE, V <sub>GS</sub> .....	$\pm 10$ V
* DRAIN CURRENT, RMS Continuous, I <sub>D</sub> .....	8 A
Pulsed, I <sub>DM</sub> .....	20 A
* POWER DISSIPATION, P <sub>T</sub>	
At T <sub>c</sub> = 25° C .....	75 W
Above T <sub>c</sub> = 25° C, Derate Linearly .....	0.6 W/°C
* OPERATING AND STORAGE TEMPERATURE, T <sub>j</sub> , T <sub>stg</sub> .....	-55 to +150° C
* LEAD TEMPERATURE, T <sub>L</sub>	
At distance $\geq$ 1/8 in. (3.17 mm) from seating plane for 10 s max. ....	260° C



NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

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## 2N6904

ELECTRICAL CHARACTERISTICS at Case Temperature ( $T_C = 25^\circ\text{C}$ ) unless otherwise specified

CHARACTERISTIC	TEST CONDITIONS	LIMITS		UNITS
		MIN.	MAX.	
Drain-Source Breakdown Voltage	$BV_{DSS}$ $I_D = 1\text{ mA}, V_{GS} = 0$	200	—	V
Gate Threshold Voltage	$V_{GS(th)}$ $V_{GS} = V_{DS}, I_D = 1\text{ mA}$	1	2	V
Zero Gate Voltage Drain Current	$I_{DSS}$ $V_{DS} = 160\text{ V}$	—	1	$\mu\text{A}$
	$T_C = 125^\circ\text{C}, V_{DS} = 160\text{ V}$	—	50	
Gate-Source Leakage Current	$I_{GSS}$ $V_{GS} = \pm 10\text{ V}, V_{DS} = 0$	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^{\#}$ $I_D = 5.1\text{ A}, V_{GS} = 5\text{ V}$	—	3.06	V
	$I_D = 8\text{ A}, V_{GS} = 5\text{ V}$	—	5.5	
Static Drain-Source On Resistance	$r_{DS(on)}^{\#}$ $I_D = 5.1\text{ A}$	—	0.6	$\Omega$
	$T_C = 125^\circ\text{C}, I_D = 5.1\text{ A}, V_{GS} = 5\text{ V}$	—	1.11	
Forward Transconductance	$g_{fs}^{\#}$ $V_{DS} = 5\text{ V}, I_D = 5.1\text{ A}$	3	12	mho
Input Capacitance	$C_{iss}$ $V_{DS} = 25\text{ V}$ $V_{GS} = 0\text{ V}$ $f = 0.1\text{ MHz}$	350	900	pF
Output Capacitance		75	250	
Reverse-Transfer Capacitance		20	100	
Turn-On Delay Time	$t_d(on)$ $V_{DS} = 100\text{ V}$ $I_D = 5.1\text{ A}$ $R_{\theta en} = R_{\theta s} = 15\ \Omega$ $V_{GS} = 5\text{ V}$	—	45	ns
Rise Time		—	150	
Turn-Off Delay Time		—	135	
Fall Time		—	150	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	—	1.67	$^\circ\text{C/W}$

### SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	TEST CONDITIONS	LIMITS		UNITS
		MIN.	MAX.	
Diode Forward Voltage	$V_{SD}^{\#}$ $I_{SD} = 8\text{ A}$	0.8	1.6	V
Reverse Recovery Time	$t_{rr}$ $I_F = 4\text{ A}$ $dI_F/dt = 100\text{ A}/\mu\text{s}$	—	625	ns

\* In accordance with JEDEC registration data.

$\#$ Pulsed: Pulse duration = 300  $\mu\text{s}$ , max., duty cycle = 2%.