

T-29-27



3N188-3N191

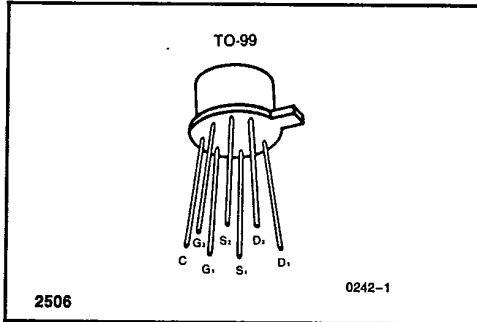
# 3N188-3N191

## Dual P-Channel Enhancement Mode MOSFET General Purpose Amplifier

### FEATURES

- Very High Input Impedance
- High Gate Breakdown 3N190-3N191
- Zener Protected Gate 3N188-3N189
- Low Capacitance

### PIN CONFIGURATION



### ABSOLUTE MAXIMUM RATINGS

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Drain-Source or Drain-Gate Voltage (Note 1)	40V
3N188, 3N189	30V
3N190, 3N191	$\pm 125\text{V}$
Transient Gate-Source Voltage (Notes 1 and 2)	$\pm 80\text{V}$
Gate-Gate Voltage	50mA
Drain Current (Note 1)	$-65^\circ\text{C}$ to $+200^\circ\text{C}$
Storage Temperature	$-55^\circ\text{C}$ to $+150^\circ\text{C}$
Operating Temperature	$+300^\circ\text{C}$
Lead Temperature (Soldering, 10sec)	300mW
Power Dissipation	525mW
One Side	4.2mW/ $^\circ\text{C}$
Both Sides	
Total Derating above $25^\circ\text{C}$	

**NOTE:** Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### ORDERING INFORMATION

TO-99
3N188
3N189
3N190
3N191

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ and $V_{BS} = 0$ unless otherwise specified)

Symbol	Parameter	Test Conditions	3N188 3N189		3N190 3N191		Units
			Min	Max	Min	Max	
$I_{GSSR}$	Gate Reverse Current	$V_{GS} = 40\text{V}$				10	pA
$I_{GSSF}$	Gate Forward Current	$V_{GS} = -40\text{V}$		-200		-10	
		$T_A = 125^\circ\text{C}$		-200		-25	
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D = -10\mu\text{A}$	-40		-40		V
$BV_{SDS}$	Source-Drain Breakdown Voltage	$I_S = -10\mu\text{A}, V_{BD} = 0$	-40		-40		
$V_{GS(th)}$	Threshold Voltage	$V_{DS} = -15\text{V}, I_D = -10\mu\text{A}$	-2.0	-5.0	-2.0	-5.0	
		$V_{DS} = V_{GS}, I_D = -10\mu\text{A}$	-2.0	-5.0	-2.0	-5.0	
$V_{GS}$	Gate Source Voltage	$V_{DS} = -15\text{V}, I_D = -500\mu\text{A}$	-3.0	-6.5	-3.0	-6.5	
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -15\text{V}$		-200		-200	pA
$I_{SDS}$	Source Drain Current	$V_{SD} = -15\text{V}, V_{DB} = 0$		-400		-400	
$r_{DS(on)}$	Drain-Source on Resistance	$V_{DS} = -20\text{V}, I_D = -100\mu\text{A}$		300		300	ohms
$I_{D(on)}$	On Drain Current	$V_{DS} = -15\text{V}, V_{GS} = -10\text{V}$	-5.0	-30.0	-5.0	-30.0	mA

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NOTE: All typical values have been characterized but are not tested.

10

3N188-3N191

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INTERNATIONAL

T-29-27

#### ELECTRICAL CHARACTERISTICS (Continued) ( $T_A = 25^\circ\text{C}$ and $V_{BS} = 0$ unless otherwise specified)

Symbol	Parameter	Test Conditions	3N188 3N189		3N190 3N191		Units
			Min	Max	Min	Max	
$g_{fs}$	Forward Transconductance (Note 3)	$V_{DS} = -15\text{V}$ , $I_D = -10\text{mA}$	1500	4000	1500	4000	$\mu\text{s}$
$Y_{OS}$	Output Admittance						
$C_{iss}$	Input Capacitance Output Shorted (Note 5)	$f = 1\text{MHz}$		4.5		4.5	pF
$C_{rfs}$	Reverse Transfer Capacitance (Note 5)			1.5		1.0	
$C_{oss}$	Output Capacitance Input Shorted (Note 5)			3.0		3.0	

#### SWITCHING CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ and $V_{BS} = 0$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Limits		Units
			Min	Max	
$t_{d(on)}$	Turn On Delay Time	$V_{DD} = -15\text{V}$ , $I_D = -10\text{mA}$ $R_G = R_L = 1.4\text{k}\Omega$ (Note 5)		15	ns
$t_r$	Rise Time			30	
$t_{off}$	Turn Off Time			50	

#### MATCHING CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ and $V_{BS} = 0$ unless otherwise specified) 3N188 and 3N190

Symbol	Parameter	Test Conditions	Limits		Units
			Min	Max	
$Y_{fs1}/Y_{fs2}$	Forward Transconductance Ratio	$V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$ , $f = 1\text{kHz}$	0.85	1.0	
$V_{GS1-2}$	Gate Source Threshold Voltage Differential	$V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$		100	mV
$\frac{\Delta V_{GS1-2}}{\Delta T}$	Gate Source Threshold Voltage Differential Change with Temperature (Note 4)	$V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$ , $T = -55^\circ\text{C}$ to $+25^\circ\text{C}$		100	$\mu\text{V}/^\circ\text{C}$
$\frac{\Delta V_{GS1-2}}{\Delta T}$	Gate Source Threshold Voltage Differential Change with Temperature (Note 4)	$V_{DS} = -15\text{V}$ , $I_D = -500\mu\text{A}$ , $T = +25^\circ\text{C}$ to $+125^\circ\text{C}$		100	$\mu\text{V}/^\circ\text{C}$

- NOTES: 1. Per transistor.  
 2. Approximately doubles for every  $10^\circ\text{C}$  increase in  $T_A$ .  
 3. Pulse test duration =  $300\mu\text{s}$ ; duty cycle  $\leq 3\%$ .  
 4. Measured at end points,  $T_A$  and  $T_B$ .  
 5. For design reference only, not 100% tested.

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