

3N188-3N191

Dual P-Channel Enhancement Mode MOSFET

General Purpose Amplifier

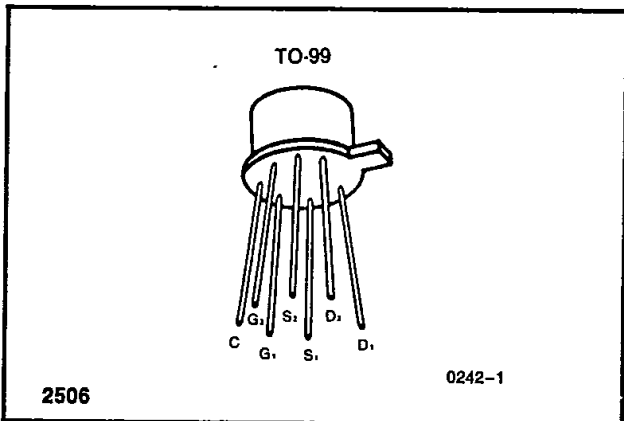


3N188-3N191

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

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.

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)	$V_{DS} = -15\text{V}$, $I_D = -10\text{mA}$	f = 1kHz	1500	4000	1500	4000	μs
Y_{os}	Output Admittance				300		300	
C_{iss}	Input Capacitance Output Shorted (Note 5)		f = 1MHz		4.5		4.5	pF
C_{rss}	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 = 1kHz	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°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°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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NOTE: All typical values have been characterized but are not tested.