LINEAR SYSTEMS

Over 30 Years of Quality Through Innovation

3N190/3N191

Dual P-Channel Enhancement Mode MOSFET

LOW TOTAL HARMONIC DISTORTION (THD) AND VOLTAGE NOISE MOSFET

FEATURES	
DIRECT REPLACEMENT FOR INTERSIL 3N190 & 3N191	
LOW GATE LEAKAGE CURRENT	I_{GSS} ≤ ±10pA
LOW TRANSFER CAPACITANCE	C_{rss} ≤ 1.0pF
ABSOLUTE MAXIMUM RATINGS[1] @ 25 °C (unless otherwise stated)	
Maximum Temperatures	
Storage Temperature	-65 to +150 °C
Operating Junction Temperature	-55 to +135 °C
Maximum Power Dissipation @ TA=25ºC	
Continuous Power Dissipation One Side	300mW
Continuous Power Dissipation Both Sides	525mW
Maximum Current	
Drain to Source[2]	30mA
Maximum Voltages	
Drain to Gate[2]	40V
Drain to Source[2]	40V
Gate to Gate	±60V

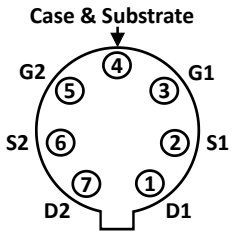
Package Photo

TO-78 7L

Side View

Pin Configuration

TO-78 7L



Top View

Features

- Very High Input Impedance
- High Gate Breakdown
- Low Capacitance
- High Switching Frequency

Benefits

- Minimal Response Time.
- Generates less heat loss compared to BJT at high currents.
- Great at amplifying analog signals.
- Reduces design complexity in medium and low power applications.
- Ideal Choice for high-side switches.
- Simplified gate driving technique reduces overall cost.

Applications

- Switching Applications
- Amplifying Circuits
- Chopper Circuits
- High-Frequency Amplifier
- Voltage Regulator Circuits
- Inverter
- DC Brushless Motor Drives
- DC Relay
- Digital Circuits

Description

The 3N190/3N191 Series is a Dual, P-Channel, Enhancement Mode MOSFET. The MOSFET is a voltage controlled solid state device. The simplicity of the design is advantageous for non-isolated POL(Point of Load) power supplies and low-voltage drives applications, where space is limited. The simplified gate driving technique is often a beneficial characteristic for designers because it reduces overall cost. The 3N190/3N191 Series has a very high switching frequency so that they are used in high-speed load switching, given their minimal response time. The 3N190/3N191 can be used for digital control of higher current and higher voltage loads than the ratings that a microcontroller can withstand. They are great at amplifying analog signals, especially in audio applications. They have multiple functions in different types of applications and can also be used as a chopper or regulator. The 3N190 and 3N191 are the same products as a second source for Intersil products.

MATCHING CHARACTERISTICS @ 25 °C (unless otherwise stated)

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	CONDITIONS
g_{fs1}/g_{fs2}	Forward Transconductance Ratio	0.85	-	1.0	-	V_{DS} = -15V, I_D = -500µA, *f* = 1kHz
V_{GS1-2}	Gate to Source Threshold Voltage Differential	-	-	100	mV	V_{DS} = -15V, I_D = -500µA
$\frac{\Delta V_{GS1-2}}{\Delta T}$	Gate to Source Threshold Voltage Differential with Temperature[4]	-	50	-	µV/°C	V_{DS} = -15V, I_D = -500µA T_S = -55 to +25 °C
$\frac{\Delta V_{GS1-2}}{\Delta T}$	Gate to Source Threshold Voltage Differential with Temperature[4]	-	50	-		V_{DS} = -15V, I_D = -500µA T_S = +25 to +125 °C

ELECTRICAL CHARACTERISTICS @ 25 °C

SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	CONDITIONS
BV_{DSS}	Drain to Source Breakdown Voltage	-40	-	-	V	I_D = -10µA
BV_{SDS}	Source to Drain Breakdown Voltage	-40	-	-		I_S = -10µA, V_{BD} = 0V
V_{GS}	Gate to Source Voltage	-3.0	-	-6.5		V_{DS} = -15V, I_D = -500µA
$V_{GS(th)}$	Gate to Source Threshold Voltage	-2.0	-	-5.0		V_{DS} = V_{GS}, I_D = -10µA
		-2.0	-	-5.0		V_{DS} = -15V, I_D = -500µA
I_{GSSR}	Reverse Gate Leakage Current	-	-	10	pA	V_{GS} = 40V
I_{GSSF}	Forward Gate Leakage Current	-	-	-10		V_{GS} = -40V
I_{DSS}	Drain Leakage Current "Off"	-	-	-200		V_{DS} = -15V
I_{SDS}	Source to Drain Leakage Current "Off"	-	-	-400		V_{SD} = -15V, V_{DB} = 0V
$I_{D(on)}$	Drain Current[2]	-5.0	-	-30.0	mA	V_{DS} = -15V, V_{GS} = -10V
I_{G1G2}	Gate to Gate Isolation Current	-	-	±1.0	µA	V_{G1G2} = ±80V, I_D = I_S = 0 = mA
g_{fs}	Forward Transconductance[4]	1500	-	4000	µS	V_{DS} = -15V, I_D = -5mA, *f* = 1kHz
g_{os}	Output Admittance	-	-	300		
$r_{ds(on)}$	Drain to Source "On" Resistance	-	-	300	Ω	V_{DS} = -20V, I_D = -100µA
C_{rss}[3]	Reverse Transfer Capacitance	-	-	1.0	pF	V_{DS} = -15V, I_D = -5mA, *f* = 1MHz
C_{iss}[3]	Input Capacitance Output Shorted	-	-	4.5		
C_{oss}[3]	Output Capacitance Input Shorted	-	-	3.0		

3N190/191 P-CHANNEL ENHANCEMENT MODE MOSFET

TO-78 7L Substrate (Case) Pin-4 Biasing Recommendation

In order to improve the overall product performance, we strongly recommend Substrate (Case) pin to be connected to highest VCC potential at Pin-4 with an optional 10KΩ resistor. This ensures strong reverse biasing of junction isolation diode and resulting improvement in Total Harmonic Distortion (THD) and Voltage Noise (Vn) performances. This applied voltage must be maximum 38V which is 2.0V less than device BVDSS breakdown voltage of 40V-max.

SWITCHING CHARACTERISTICS

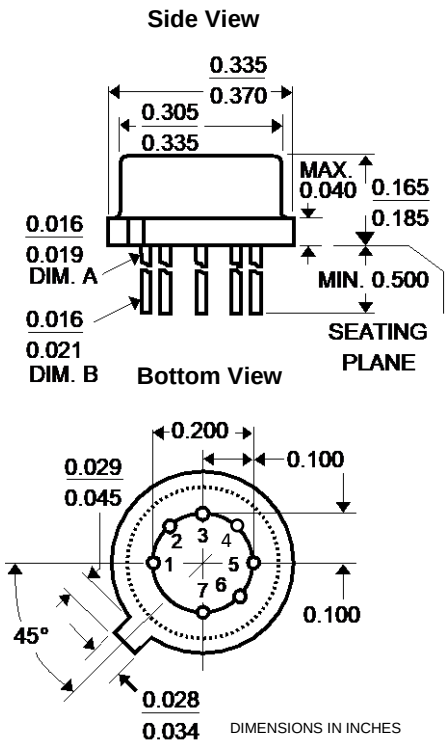
SYMBOL	CHARACTERISTIC	MIN	TYP	MAX	UNITS	CONDITIONS
$t_{d(on)}$[3]	Turn On Delay Time	-	-	15	ns	V_{DD} = -15V, $I_{D(on)}$ = -5mA,
t_r[3]	Turn On Rise Time	-	-	30		R_G = R_L = 1.4kΩ
t_{off}[3]	Turn Off Time	-	-	50		

Notes

1. Absolute maximum ratings are limiting values above which serviceability may be impaired.
2. Per Transistor.
3. For design reference only. Not 100% tested.
4. Measured at end points, T_A and T_B.
5. All characteristics MIN/TYP/MAX numbers are absolute values. Negative values indicate electrical polarity only.

Package Dimensions

TO-78 7 Lead



DIMENSIONS IN INCHES

Ordering Information

Standard Part Call-Out
3N190 TO-78 7L RoHS
3N191 TO-78 7L RoHS
Custom Part Call-Out (Custom Parts Include SEL + 4 Digit Numeric Code)
3N190 TO-78 7L RoHS SELXXXX
3N191 TO-78 7L RoHS SELXXXX