

signetics

D-MOS FIELD EFFECT TRANSISTOR **SD200**
N-CHANNEL ENHANCEMENT **SD201**
UHF AND GENERAL PURPOSE
RF APPLICATIONS

DESCRIPTION

The Signetics D-MOS SD200, SD201 are silicon insulated-gate field effect transistors of the n-channel enhancement mode type. They are fabricated by a new principle which gives superior high frequency performance up to 2 GHz. A special diode is connected between the gate and case of the SD201 that bypasses any voltage transient lying outside the range of -0.3 volts to +15 volts. Thus the gate of the SD201 is protected against damage in all normal handling and operating situations. Both devices are general purpose transistors especially suited for amplifier designs in the UHF range (500 MHz to 1 GHz). They have extremely high transconductance (15,000 mhos typ.), very low input capacitance (2.0 pF typ.) and extremely low feedback capacitance (0.13 pF typ.). The devices are hermetically sealed in modified 4 lead TO-72 packages. The SD200, SD201 combine high gain with low levels of noise, intermodulation and feedback capacitance. These parameters make them ideally suited for critical amplifier applications.

FEATURES

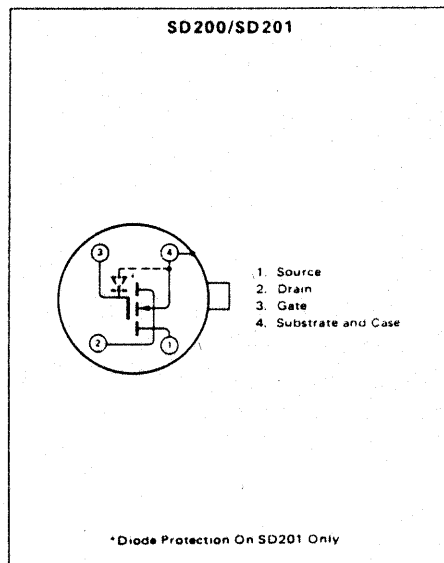
- HIGH GAIN THROUGH UHF RANGE (10 dB TYP. AT 1 GHz)
- ION IMPLANTED FOR GREATER CONTROL AND RELIABILITY
- LOW NOISE THROUGH UHF RANGE (4.5 dB TYP. AT 1 GHz)
- LOW INPUT CAPACITANCE (2.0 pF TYP.)
- LOW FEEDBACK CAPACITANCE (0.13 pF TYP.)
- HIGH DRAIN-TO-SOURCE VOLTAGE (+30V TYP.)
- HIGH FORWARD TRANSCONDUCTANCE (15,000 μ MHOS TYP.)
- WIDE DYNAMIC RANGE
- POSITIVE BIAS ONLY

ABSOLUTE MAXIMUM RATINGS

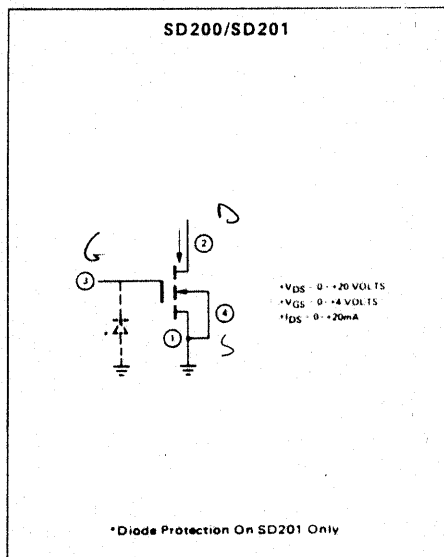
($T_A = 25^\circ\text{C}$ Unless Otherwise Specified)

Drain-to-Source Voltage (V_{DS})	+25V
Drain-to-Substrate Voltage (V_{DB})	+25, -0.3V
Source-to-Substrate Voltage (V_{SB})	+14, -0.3V
DC Gate-to-Source Voltage (V_{GS})	
SD200	$\pm 40V$
SD201	-0.3, +15V
Drain Current (I_D)	50 mA
Ambient Temperature Range	
Storage	-65°C to 175°C
Operating	-65°C to 125°C
Transistor Dissipation (P_T)	
At 25°C Case Temperature	300 mW
Temperature Above 25°C	derate at 2mW/°C

PIN CONFIGURATION (Bottom Views)



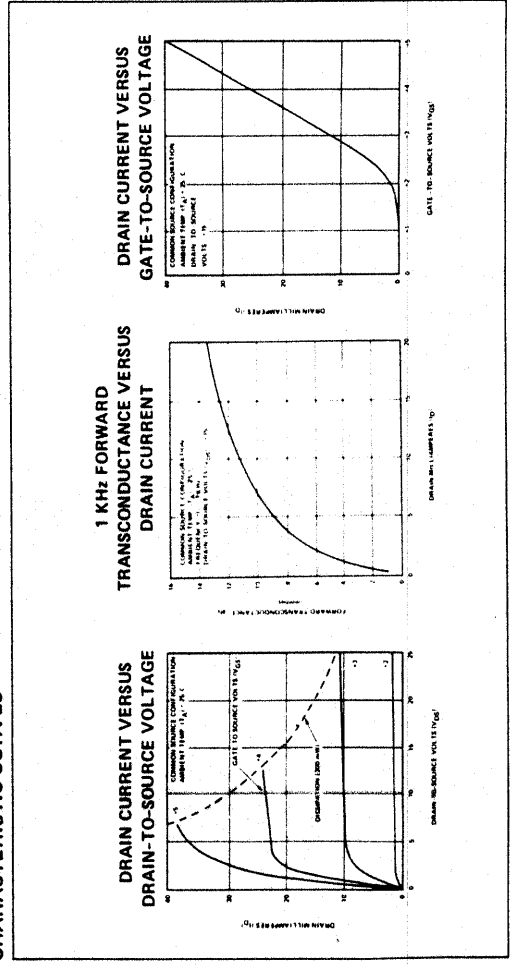
COMMON SOURCE BIAS SCHEME



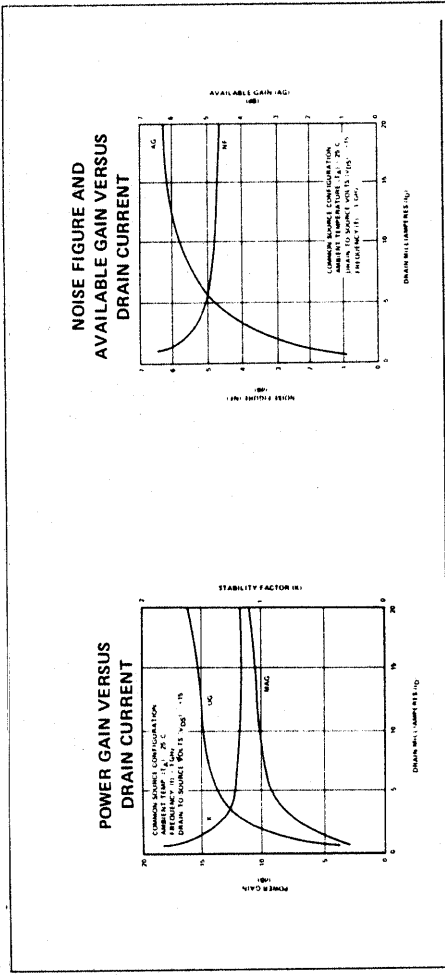
ELECTRICAL CHARACTERISTICS SD200, SD201 AT TA = 25 °C

CHARACTERISTIC	SYMBOL	CONDITIONS	LIMITS			UNITS
			MIN	TYP	MAX	
Drain to Source Breakdown Voltage	BV _{DS}	V _{GS} = 0V, I _D < 1μA	+25	+30		V
Gate Leakage Current	I _{GSS}	SD200 V _{GS} = ±10V, V _{DS} = 0V			0.1	nA
		SD201 V _{GS} = +10V, V _{DS} = 0V			1.0	μA
Drain to Source Current	I _D (off)	V _{DS} = 15V, V _{GS} = 0V			1.0	μA
Zero Bias Drain Current	I _{DSS}	V _{DS} = 15V, V _{GS} = 0V			1.0	μA
Threshold Voltage	V _T	V _{DS} = V _{GS} = V _T , I _D = 1μA	+0.5	+1.0	+2.5	V
Forward Transconductance	g _{fs}	V _{DS} = 15V, V _{GS} ≅ 4V, I _D = 20 mA, f = 1 KHz	13.0	15.0		mmhos
Small Signal Short Circuit Capacitances	C _{iss}			2.0	2.6	
	C _{oss}			1.0	1.2	pF
	C _{rss}			0.13	0.3	
Power Gain	G _{PS}	V _{DS} = 15V, V _{GS} ≅ 4V, I _D = 20 mA, f = 1 GHz	8	10		dB
Noise Figure	NF	V _{DS} = 15V, V _{GS} ≅ 4V, I _D = 20 mA, f = 1 GHz		4.5	6.0	dB
Drain to Source on Resistance	r _{DS(on)}	V _{GS} = 5V, I _D = 0.1 mA		40	70	ohms
Intercept Point	P _i	V _{DS} = 15V, I _D = 20 mA, f = 1 GHz, Δf = 2 MHz		29		dBm

CHARACTERISTIC CURVES

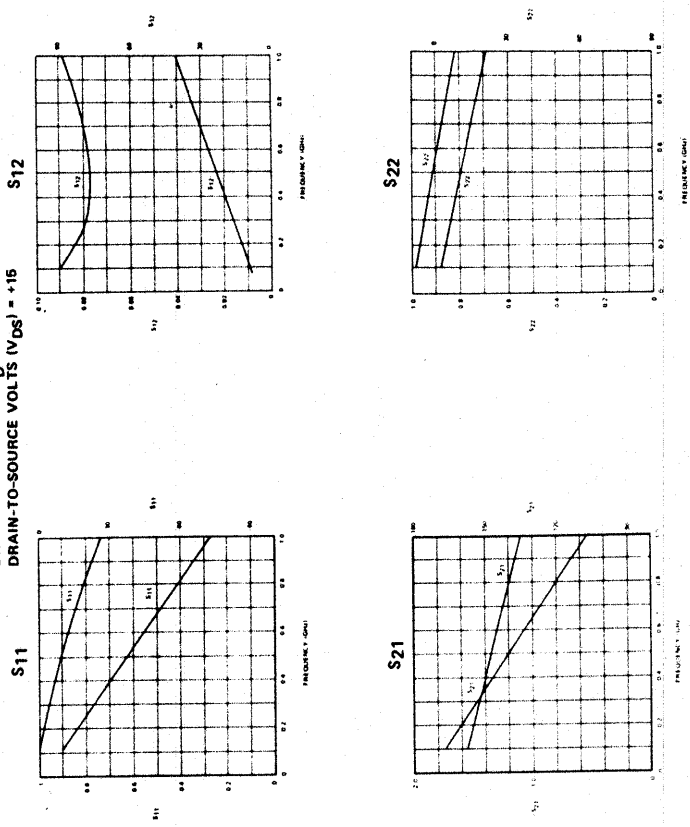


CHARACTERISTIC CURVES (Cont'd.)

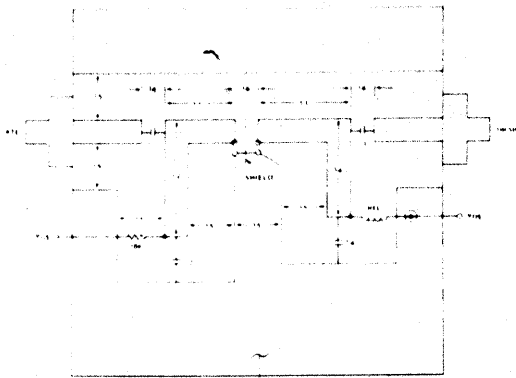


"S" PARAMETERS

COMMON SOURCE CONFIGURATION
 AMBIENT TEMPERATURE (TA) = 25 °C
 DRAIN MILLIAMPERES (ID) = 20
 DRAIN-TO-SOURCE VOLTS (VDS) = +15



1 GHz NOISE FIGURE AND POWER GAIN TEST FIXTURE



Dielectric is 1/16" teflon fiberglass (3M-K6098 11)

All microstrip width = 0.175 inch

- L₁ = 0.48 inch
- L₂ = 1.52 inches
- L₃ = 0.64 inch
- L₄ = 1.36 inches
- L₅ = 5/16 inch
- L₆ = 1/8 inch

C₁ = C₂ = C₃ = 0.8-10pF
Johanson 5201

C₄ = 1-20pF
Johanson 5501

RFC = 10 turns 1/4" Diam
26 AWG

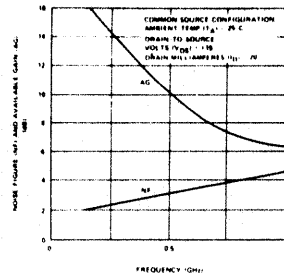
1000pF bypass

Cory FT4-01-2

Launchers are OSM248-2

Note: Shield and 4 tunable capacitors on ground plane side of amplifier

OPTIMUM NOISE FIGURE AND AVAILABLE GAIN VERSUS FREQUENCY



DESCRIPTION

The Signetics D-MOS enhanced-gate field effect enhancement mode type principle which gives performance up to 2 GHz. A balance between the gate and any voltage transient lying volts to +10 volts. Thus protected against damage operating situations. Both transistors especially suited UHF range (500 MHz to high transconductance (2 input capacitance (3.0 pF back capacitance (0.20 pF) metrically sealed in modified SD202, SD203 combine noise, intermodulation parameters make them amplifier applications.

FEATURES

- HIGH GAIN THROUGH 1.5 GHz)
- ION IMPLANTED FOR RELIABILITY
- LOW NOISE THROUGH AT 1.0 GHz)
- LOW INPUT CAPACITANCE
- LOW FEEDBACK CAPACITANCE
- HIGH DRAIN-TO-SOURCE VOLTAGE
- HIGH FORWARD TRANSCONDUCTANCE (μMHOS TYP.)
- WIDE DYNAMIC RANGE
- POSITIVE BIAS ONLY

ABSOLUTE MAXIMUM RATINGS

Drain-to-Source Voltage (V_{DS})
Drain-to-Substrate Voltage (V_{DS})
Source-to-Substrate Voltage (V_{SS})
DC Gate-to-Source Voltage (V_{GS})
SD202
SD203