TEMIC

Siliconix

3N163/164

P-Channel Enhancement-Mode MOS Transistors

Product Summary

Part Number	$V_{(BR)DSS}$ Min (V)	$V_{GS(th)}$ (V)	$r_{DS(on)}$ Max (Ω)	$I_{D(on)}$ Min (mA)	C_{rss} Max (pF)	t_{ON} Typ (ns)
3N163	−40	−2 to −5	250	−5	0.7	18
3N164	−30	−2 to −5	300	−3	0.7	18

Features

- Ultra-Low Input Leakage: 0.02 pA Typ.
- High Gate Breakdown Voltage: ± 125 V
- Normally Off

Benefits

- High Input Impedance Isolation
- Minimize Handling ESD Problems
- High Off Isolation without Power

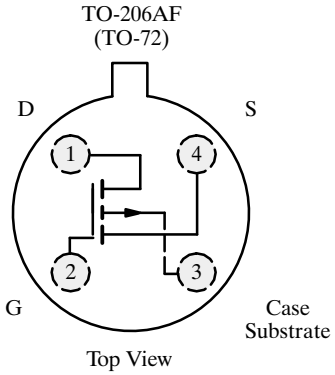
Applications

- Ultra-High Input Impedance Amplifier
- Smoke Detectors
- Electrometers
- Analog Switching
- Digital Switching

Description

The 3N163/164 are lateral p-channel MOSFETs designed for analog switch and preamplifier applications where high speed and low parasitic capacitances are required.

The hermetic TO-206AF package is compatible with military processing per military standards (see Military information).



Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Drain-Source Voltage (3N163) . . . . . −40 V
(3N164) . . . . . −30 V

Gate-Source Voltage . . . . . ± 30 V

Continuous Drain Current . . . . . −50 mA

Lead Temperature ($^1/_{16}$" from case for 10 seconds) . . . . . 300°C

Storage Temperature . . . . . −65 to 200°C

Operating Junction Temperature . . . . . −55 to 150°C

Power Dissipation[a] . . . . . 375 mW

Notes:
a. Derate 3 mW/°C above 25°C

3N163/164

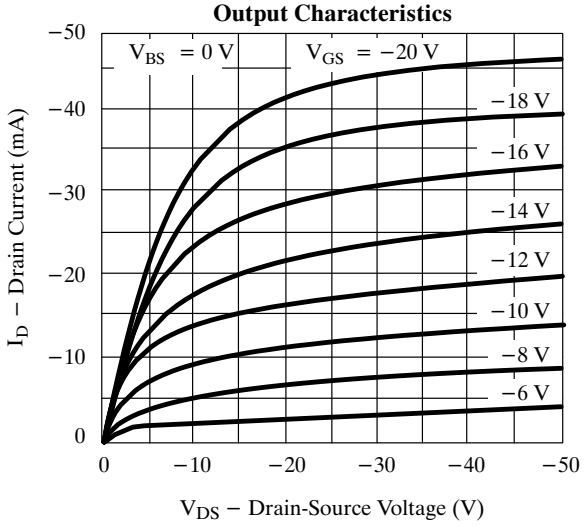
Specifications[a]

Parameter	Symbol	Test Conditions	Typ[b]	Limits 3N163 Min	Limits 3N163 Max	Limits 3N164 Min	Limits 3N164 Max	Unit
Static								
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -10$ µA, $V_{DS} = 0$ V	−70	−40		−30		V
Source-Drain Breakdown Voltage	$V_{(BR)SDS}$	$I_S = -10$ µA, $V_{GD} = V_{BD} = 0$ V	−70	−40		−30		V
Gate-Threshold Voltage	$V_{GS(th)}$	$I_D = -10$ µA, $V_{GS} = V_{DS}$	−2.5	−2	−5	−2	−5	V
Gate-Source Voltage	V_{GS}	$I_D = -0.5$ mA, $V_{DS} = -15$ V	−3.5	−3	−6.5	−2.5	−6.5	V
Gate-Body Leakage	I_{GSS}	$V_{GS} = -40$ V, $V_{DS} = 0$ V	< −1		−10			pA
		$T_A = 125°C$[d]	−1					pA
		$V_{GS} = -30$ V, $V_{DS} = 0$ V	< −1				−10	pA
		$T_A = 125°C$[d]	−1					pA
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -15$ V, $V_{GS} = 0$ V	−8		−200		−400	pA
		$T_A = 125°C$[d]	−20					nA
Zero-Gate Voltage Source Current	I_{SDS}	$V_{GD} = V_{BD} = 0$ V, $V_{SD} = -20$ V	−10		−400		−800	pA
		$T_A = 125°C$[d]	−25					nA
On-State Drain Current[c]	$I_{D(on)}$	$V_{DS} = -15$ V, $V_{GS} = -10$ V	−10	−5	−30	−3	−30	mA
Drain-Source On-Resistance	$r_{DS(on)}$	$V_{GS} = -20$ V, $I_D = -100$ µA	180		250		300	Ω
		$T_A = 125°C$[d]	270					Ω
Dynamic								
Forward Transconductance[c]	g_{fs}	$V_{DS} = -15$ V, $I_D = -10$ mA, f = 1 kHz	2.7	2	4	1	4	mS
Common-Source Output Conductance[c]	g_{os}	$V_{DS} = -15$ V, $I_D = -10$ mA, f = 1 kHz	150		250		250	µS
Input Capacitance	C_{iss}	$V_{DS} = -15$ V, $I_D = -10$ mA, f = 1 MHz	2.4		3.5		3.5	pF
Output Capacitance	C_{oss}	$V_{DS} = -15$ V, $I_D = -10$ mA, f = 1 MHz	2.5		3		3	pF
Reverse Transfer Capacitance	C_{rss}	$V_{DS} = -15$ V, $I_D = -10$ mA, f = 1 MHz	0.5		0.7		0.7	pF
Switching[e]								
Turn-On Time	$t_{d(on)}$	$V_{DD} = -15$ V, $R_L = 1500$ Ω, $I_D \cong -10$ mA, $V_{GEN} = -12$ V, $R_G = 50$ Ω	5		12		12	ns
	t_r	$V_{DD} = -15$ V, $R_L = 1500$ Ω, $I_D \cong -10$ mA, $V_{GEN} = -12$ V, $R_G = 50$ Ω	13		24		24	ns
Turn-Off Time	$t_{d(off)}$	$V_{DD} = -15$ V, $R_L = 1500$ Ω, $I_D \cong -10$ mA, $V_{GEN} = -12$ V, $R_G = 50$ Ω	25		50		50	ns

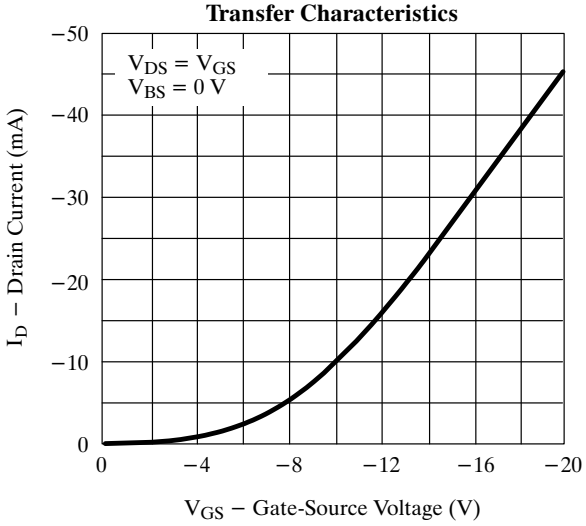
Notes:
a. $T_A = 25°C$ unless otherwise noted. MRA
b. Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
c. Pulse test: PW ≤ 300 µs duty cycle ≤ 3%.
d. This parameter not registered with JEDEC.
e. Switching time is essentially independent of operating temperature.

Typical Characteristics

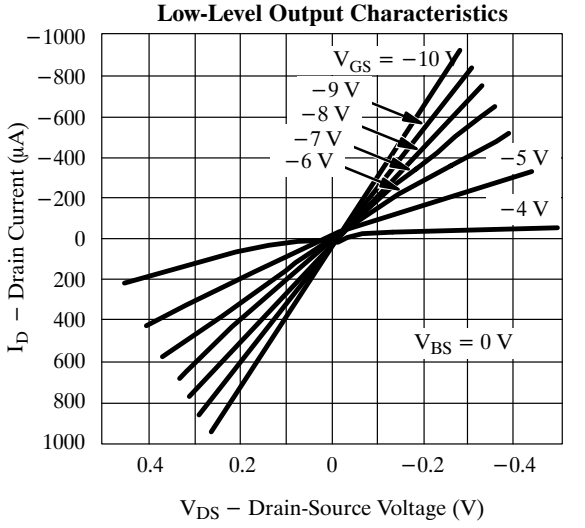
Output Characteristics



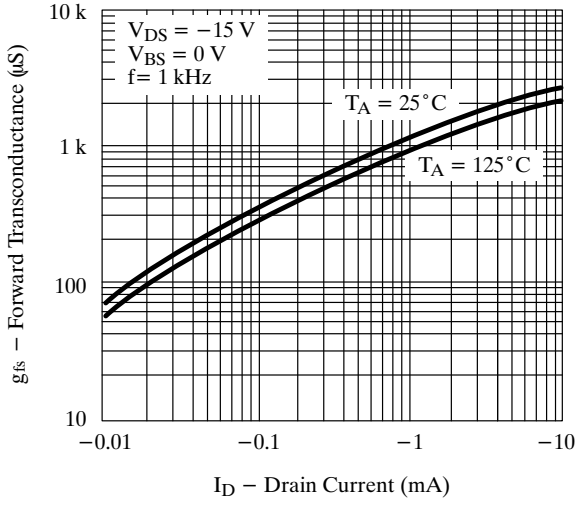
Transfer Characteristics



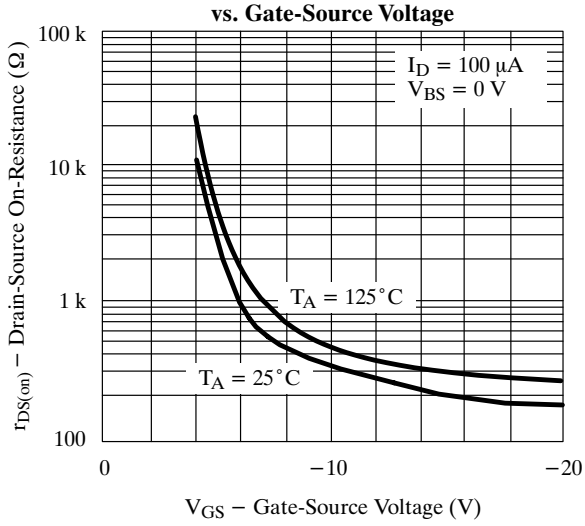
Low-Level Output Characteristics



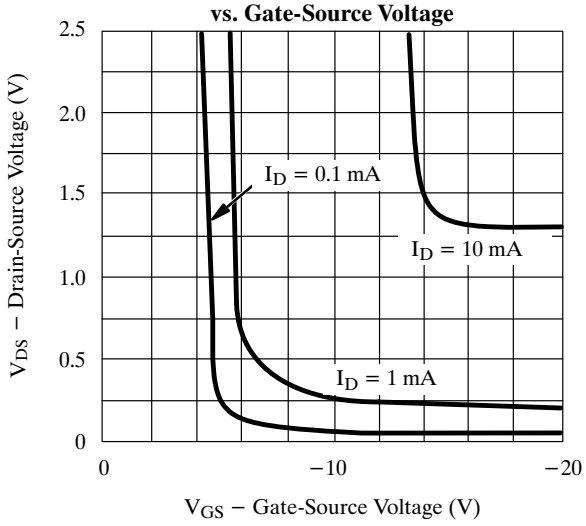
Common-Source Forward Transconductance vs. Drain Current



Drain-Source On-Resistance vs. Gate-Source Voltage

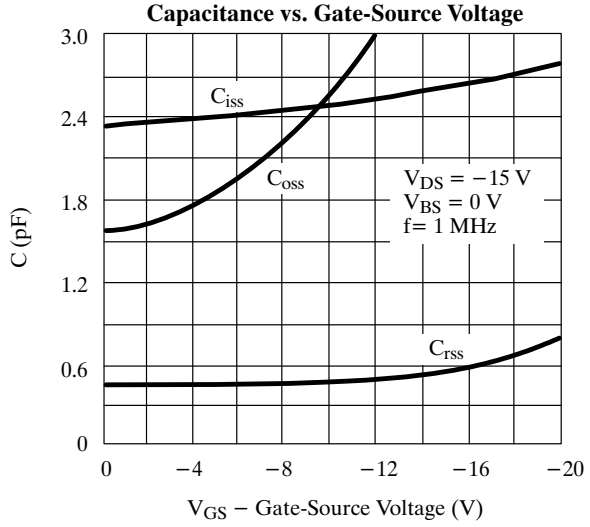


Low-Level Drain-Source On-Voltage vs. Gate-Source Voltage

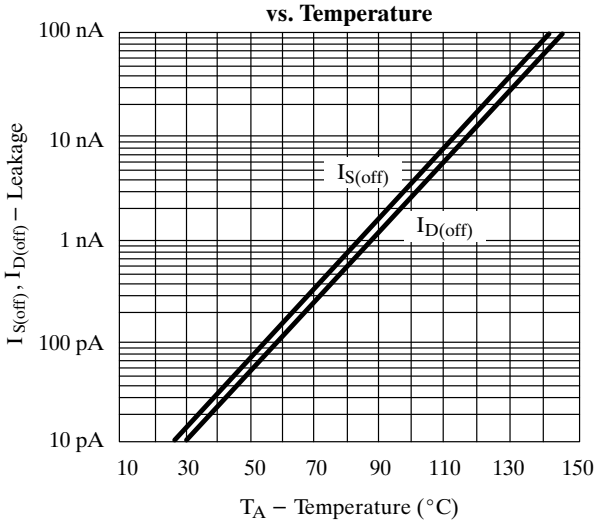


Typical Characteristics (Cont'd)

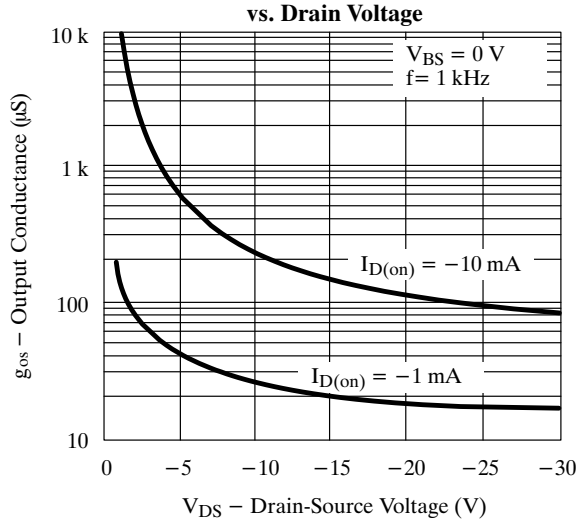
Capacitance vs. Gate-Source Voltage



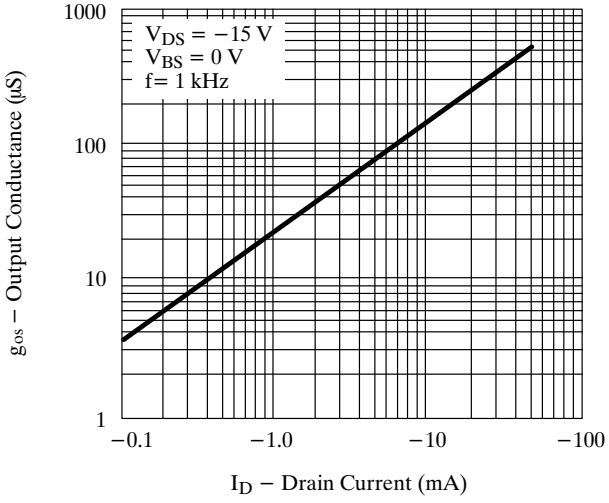
Drain-Source Leakage Current vs. Temperature



Common-Source Output Conductance vs. Drain Voltage



Common-Source Output Conductance vs. Drain Current



Switching Time Test Circuit