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3N169
3N170
3N171

MOSFET
SWITCHING

TO-72

MAXIMUM RATINGS — **N-CHANNEL — ENHANCEMENT**

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	25	Vdc
Drain-Gate Voltage	V_{DG}	±35	Vdc
Gate-Source Voltage	V_{GS}	±35	Vdc
Drain Current	I_D	30	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	300 1.7	mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	800 4.56	mW mW/°C
Junction Temperature Range	T_J	175	°C
Storage Temperature Range	T_{stg}	−65 to +175	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage (I_D = 10 μAdc, V_{GS} = 0)		$V_{(BR)DSX}$	25	—	Vdc
Zero-Gate-Voltage Drain Current (V_{DS} = 10 Vdc, V_{GS} = 0) (V_{DS} = 10 Vdc, V_{GS} = 0, T_A = 125°C)		I_{DSS}	— —	10 1.0	nAdc μAdc
Gate Reverse Current (V_{GS} = −35 Vdc, V_{DS} = 0) (V_{GS} = −35 Vdc, V_{DS} = 0, T_A = 125°C)		I_{GSS}	— —	10 100	pAdc
ON CHARACTERISTICS					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 10 μAdc)	3N169 3N170 3N171	$V_{GS(Th)}$	 0.5 1.0 1.5	 1.5 2.0 3.0	Vdc
Drain-Source On-Voltage (I_D = 10 mAdc, V_{GS} = 10 Vdc)		$V_{DS(on)}$	—	2.0	Vdc
On-State Drain Current (V_{GS} = 10 Vdc, V_{DS} = 10 Vdc)		$I_{D(on)}$	10	—	mAdc
SMALL-SIGNAL CHARACTERISTICS					
Drain-Source Resistance (V_{GS} = 10 Vdc, I_D = 0, f = 1.0 kHz)		$r_{ds(on)}$	—	200	Ohms
Forward Transfer Admittance (V_{DS} = 10 Vdc, I_D = 2.0 mAdc, f = 1.0 kHz)		$\|Y_{fs}\|$	1000	—	μmhos
Input Capacitance (V_{DS} = 10 Vdc, V_{GS} = 0, f = 1.0 MHz)		C_{iss}	—	5.0	pF
Reverse Transfer Capacitance (V_{DS} = 0, V_{GS} = 0, f = 1.0 MHz)		C_{rss}	—	1.3	pF
Drain-Substrate Capacitance ($V_{D(SUB)}$ = 10 Vdc, f = 1.0 MHz)		$C_{d(sub)}$	—	5.0	pF
SWITCHING CHARACTERISTICS					
Turn-On Delay Time	(V_{DD} = 10 Vdc, $I_{D(on)}$ = 10 mAdc, $V_{GS(on)}$ = 10 Vdc, $V_{GS(off)}$ = 0, R_G' = 50 Ohms) See Figure 1	$t_{d(on)}$	—	3.0	ns
Rise Time		t_r	—	10	ns
Turn-Off Delay Time		$t_{d(off)}$	—	3.0	ns
Fall Time		t_f	—	15	ns

3N169, 3N170, 3N171 (continued)

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Substrate connected to source.

Characteristic		Figure No.	Symbol	Min	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage (I_D = 10 μAdc, V_{GS} = 0)		–	$V_{(BR)DSS}$	25	–	Vdc
*Gate Leakage Current (V_{GS} = -35 Vdc, V_{DS} = 0)		–	I_{GSS}	–	10	pAdc
(V_{GS} = -35 Vdc, V_{DS} = 0, T_A = 125°C)				–	100	
*Zero-Gate-Voltage Drain Current (V_{DS} = 10 Vdc, V_{GS} = 0)		–	I_{DSS}	–	10	nAdc
(V_{DS} = 10 Vdc, V_{GS} = 0, T_A = 125°C)				–	1.0	μAdc
***ON CHARACTERISTICS**						
Gate-Source Threshold Voltage (V_{DS} = 10 Vdc, I_D = 10 μAdc)	3N169	–	$V_{GS(th)}$	0.5	1.5	Vdc
	3N170			1.0	2.0	
	3N171			1.5	3.0	
"ON" Drain Current (V_{GS} = 10 Vdc, V_{DS} = 10 Vdc)		3	$I_{D(on)}$	10	–	mAdc
Drain-Source "ON" Voltage (I_D = 10 mAdc, V_{GS} = 10 Vdc)		–	$V_{DS(on)}$	–	2.0	Vdc
SMALL SIGNAL CHARACTERISTICS						
*Drain-Source Resistance (V_{GS} = 10 Vdc, I_D = 0, f = 1.0 kHz)		4	$r_{ds(on)}$	–	200	Ohms
Forward Transfer Admittance (V_{DS} = 10 Vdc, I_D = 2.0 mAdc, f = 1.0 kHz)		1	$\|Y_{fs}\|$	1000	–	μmhos
*Reverse Transfer Capacitance (V_{DS} = 0, V_{GS} = 0, f = 1.0 MHz)		2	C_{rss}	–	1.3	pF
*Input Capacitance (V_{DS} = 10 Vdc, V_{GS} = 0, f = 1.0 MHz)		2	C_{iss}	–	5.0	pF
*Drain-Substrate Capacitance ($V_{D(SUB)}$ = 10 Vdc, f = 1.0 MHz)		–	$C_{d(sub)}$	–	5.0	pF
***SWITCHING CHARACTERISTICS**						
Turn-On Delay Time	(V_{DD} = 10 Vdc, $I_{D(on)}$ = 10 mAdc, $V_{GS(on)}$ = 10 Vdc, $V_{GS(off)}$ = 0, R_G = 50 Ohms)	6,10	$t_{d(on)}$	–	3.0	ns
Rise Time		7,10	t_r	–	10	ns
Turn-Off Delay Time		8,10	$t_{d(off)}$	–	3.0	ns
Fall Time		9,10	t_f	–	15	ns

*Indicates JEDEC Registered Data.

FIGURE 1 – FORWARD TRANSFER ADMITTANCE

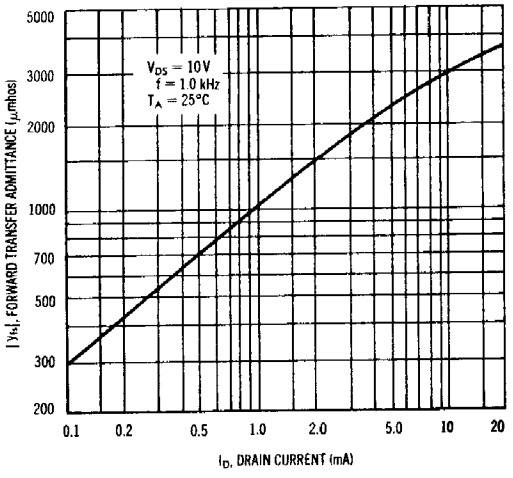
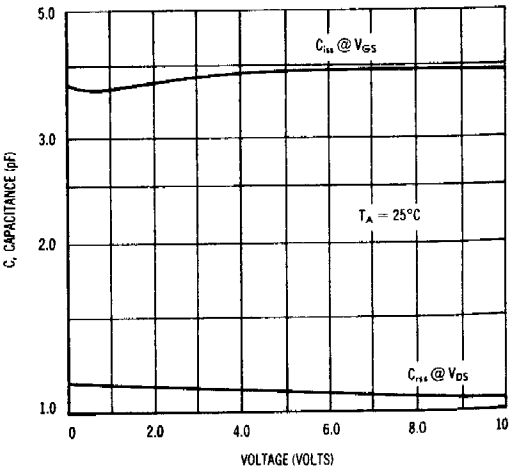
FIGURE 2 – CAPACITANCE