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## NTE2980 Logic Level MOSFET N-Channel, Enhancement Mode High Speed Switch TO251

**Features:**

- Dynamic dv/dt Rating
- Logic Level Gate Drive
- $R_{DS(on)}$  Specified at  $V_{GS} = 4V$  &  $5V$
- Fast Switching
- TO251 Type Package

**Absolute Maximum Ratings:**

Drain Current, $I_D$	
Continuous ( $V_{GS} = 5V$ )	
$T_C = +25^\circ C$ .....	7.7A
$T_C = +100^\circ C$ .....	4.9A
Pulsed (Note 1) .....	31A
Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	25W
Derate Above $25^\circ C$ .....	0.20W/ $^\circ C$
Total Power Dissipation (PC Board Mount, $T_C = +25^\circ C$ , Note 2), $P_D$ .....	2.5W
Derate Above $25^\circ C$ .....	0.02W/ $^\circ C$
Gate-Source Voltage, $V_{GS}$ .....	$\pm 10V$
Single Pulsed Avalanche Energy (Note 3), $E_{AS}$ .....	47mJ
Peak Diode Recovery dv/dt (Note 4), dv/dt .....	4.5V/ns
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+150^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ C$
Maximum Lead Temperature (During Soldering, 1.6mm from case, 10sec), $T_L$ .....	$+260^\circ C$
Maximum Thermal Resistance:	
Junction-to-Case, $R_{thJC}$ .....	5.0 $^\circ C/W$
Junction-to-Ambient (PCB Mount, Note 2), $R_{thJA}$ .....	50 $^\circ C/W$
Junction-to-Ambient, $R_{thJA}$ .....	110 $^\circ C/W$

- Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.  
 Note 2. When mounted on a 1" square PCB (FR-4 or G-10 material).  
 Note 3.  $L = 924\mu H$ ,  $V_{DD} = 25V$ ,  $R_G = 25\Omega$ , Starting  $T_J = +25^\circ C$ ,  $I_{AS} = 7.7A$ .  
 Note 4.  $I_{SD} \leq 10A$ ,  $di/dt \leq 90A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq +150^\circ C$ .

**Electrical Characteristics:** ( $T_J = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain–Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	60	–	–	V
Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS} / \Delta T_J$	Reference to $+25^\circ\text{C}$ , $I_D = 1\text{mA}$	–	0.073	–	$V/^\circ\text{C}$
Static Drain–Source ON Resistance	$R_{DS(on)}$	$V_{GS} = 5V, I_D = 4.6A$ , Note 5	–	–	0.20	$\Omega$
		$V_{GS} = 4V, I_D = 3.9A$ , Note 4	–	–	0.28	$\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	–	2.0	V
Forward Transconductance	$g_{fs}$	$V_{DS} = 25V, I_D = 4.6A$ , Note 5	3.4	–	–	mhos
Drain–to–Source Leakage Current	$I_{DSS}$	$V_{DS} = 60V, V_{GS} = 0$	–	–	25	$\mu A$
		$V_{DS} = 48V, V_{GS} = 0V, T_C = +125^\circ\text{C}$	–	–	250	$\mu A$
Gate–Source Leakage Forward	$I_{GSS}$	$V_{GS} = 10V$	–	–	100	nA
Gate–Source Leakage Reverse	$I_{GSS}$	$V_{GS} = -10V$	–	–	-100	nA
Total Gate Charge	$Q_g$	$V_{GS} = 5V, I_D = 10A, V_{DS} = 48V$ , Note 5	–	–	8.4	nC
Gate–Source Charge	$Q_{gs}$		–	–	3.5	nC
Gate–Drain (“Miller”) Charge	$Q_{gd}$		–	–	6.0	nC
Turn–On Delay Time	$t_{d(on)}$	$V_{DD} = 30V, I_D = 10A, R_G = 12\Omega, R_D = 2.8\Omega$ , Note 5	–	9.3	–	ns
Rise Time	$t_r$		–	110	–	ns
Turn–Off Delay Time	$t_{d(off)}$		–	17	–	ns
Fall Time	$t_f$		–	26	–	ns
Internal Drain Inductance	$L_D$	Between lead, 6mm (0.25”) from package and center of die contact	–	4.5	–	nH
Internal Source Inductance	$L_S$		–	7.5	–	nH
Input Capacitance	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	–	400	–	pF
Output Capacitance	$C_{oss}$		–	170	–	pF
Reverse Transfer Capacitance	$C_{rss}$		–	42	–	pF
<b>Source–Drain Diode Ratings and Characteristics</b>						
Continuous Source Current	$I_S$	(Body Diode)	–	–	7.7	A
Pulse Source Current	$I_{SM}$	(Body Diode) Note 1	–	–	31	A
Diode Forward Voltage	$V_{SD}$	$T_J = +25^\circ\text{C}, I_S = 7.7A, V_{GS} = 0V$ , Note 5	–	–	1.6	V
Reverse Recovery Time	$t_{rr}$	$T_J = +25^\circ\text{C}, I_F = 10A, di/dt = 100A/\mu s$ , Note 5	–	65	130	ns
Reverse Recovery Charge	$Q_{rr}$		–	0.33	0.65	$\mu C$
Forward Turn–On Time	$t_{on}$	Intrinsic turn–on time is negligible (turn–on is dominated by $L_S + L_D$ )				

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 5. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

