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## NTE2996 MOSFET N-Channel, Enhancement Mode High Speed Switch

**Features:**

- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- +175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated

**Absolute Maximum Ratings:**

Drain Current, $I_D$	
Continuous ( $V_{GS} = 10V$ )	
$T_C = +25^\circ C$ (Note 1) .....	84A
$T_C = +100^\circ C$ .....	59A
Pulsed (Note 2) .....	330A
Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	200W
Derate Above $25^\circ C$ .....	1.4W/ $^\circ C$
Gate-Source Voltage, $V_{GS}$ .....	$\pm 20V$
Single Pulsed Avalanche Energy ( $I_{AS} = 50A$ , $L = 260\mu H$ , Note 3), $E_{AS}$ .....	320mJ
Avalanche Current (Note 2), $I_{AR}$ .....	50A
Repetitive Avalanche Energy (Note 2), $E_{AR}$ .....	17mJ
Peak Diode Recovery dv/dt (Note 4), dv/dt .....	4.0V/ns
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+175^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+175^\circ C$
Maximum Lead Temperature (During Soldering, 1.6mm from case, 10sec), $T_L$ .....	$+300^\circ C$
Maximum Thermal Resistance:	
Junction-to-Case, $R_{thJC}$ .....	0.75 $^\circ C/W$
Junction-to-Ambient, $R_{thJA}$ .....	62 $^\circ C/W$
Typical Thermal Resistance, Case-to-Sink (Flat, greased surface), $R_{thCS}$ .....	0.50 $^\circ C/W$

- Note 1. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.
- Note 2. Repetitive Rating: Pulse width limited by maximum junction temperature.
- Note 3. This is a calculated value limited to  $T_J = +175^\circ C$ .
- Note 4.  $I_{SD} \leq 50A$ ,  $di/dt \leq 230A/\mu s$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq +175^\circ C$ .

**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 $+25^\circ\text{C}$ , $I_D = 1mA$	–	0.064	–	$V/^\circ\text{C}$
Static Drain–Source ON Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 50A$ , Note 5	–	–	12	$\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	–	4.0	V
Forward Transconductance	$g_{fs}$	$V_{DS} = 25V, I_D = 50A$ , Note 5	69	–	–	mhos
Drain–to–Source Leakage Current	$I_{DSS}$	$V_{DS} = 60V, V_{GS} = 0$	–	–	25	$\mu A$
		$V_{DS} = 48V, V_{GS} = 0V, T_C = +150^\circ\text{C}$	–	–	250	$\mu A$
Gate–Source Leakage, Forward	$I_{GSS}$	$V_{GS} = 20V$	–	–	100	nA
Gate–Source Leakage, Reverse		$V_{GS} = -20V$	–	–	-100	nA
Total Gate Charge	$Q_g$	$V_{GS} = 10V, I_D = 50A, V_{DS} = 48V$	–	–	130	nC
Gate–Source Charge	$Q_{gs}$		–	–	28	nC
Gate–Drain (“Miller”) Charge	$Q_{gd}$		–	–	44	nC
Turn–On Delay Time	$t_{d(on)}$	$V_{DD} = 30V, I_D = 50A, R_G = 3.6\Omega, V_{GS} = 10V$ , Note 5	–	12	–	ns
Rise Time	$t_r$		–	78	–	ns
Turn–Off Delay Time	$t_{d(off)}$		–	48	–	ns
Fall Time	$t_f$		–	53	–	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	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$	–	3210	–	pF
Output Capacitance	$C_{oss}$		–	690	–	pF
Reverse Transfer Capacitance	$C_{rss}$		–	140	–	pF
<b>Source–Drain Diode Ratings and Characteristics</b>						
Continuous Source Current	$I_S$	(Body Diode) Note 6	–	–	84	A
Pulse Source Current	$I_{SM}$	(Body Diode) Note 2	–	–	330	A
Diode Forward Voltage	$V_{SD}$	$T_J = +25^\circ\text{C}, I_S = 50A, V_{GS} = 0V$ , Note 5	–	–	1.3	V
Reverse Recovery Time	$t_{rr}$	$T_J = +25^\circ\text{C}, I_F = 50A, di/dt = 100A/\mu s$ , Note 5	–	73	110	ns
Reverse Recovery Charge	$Q_{rr}$		–	220	330	$\mu C$
Forward Turn–On Time	$t_{on}$	Intrinsic turn–on time is negligible (turn–on is dominated by $L_S + L_D$ )				

Note 2. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 5. Pulse Width  $\leq 400\mu s$ , Duty Cycle  $\leq 2\%$ .

Note 6. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A.

