

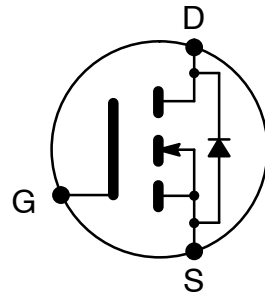


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## NTE2399 MOSFET N-Ch, Enhancement Mode High Speed Switch TO220 Type Package

**Features:**

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements



**Absolute Maximum Ratings:**

Continuous Drain Current ( $V_{GS} = 10V$ ), $I_D$	
$T_C = +25^\circ C$ .....	3.1A
$T_C = +100^\circ C$ .....	2.0A
Pulsed Drain Current (Note 1), $I_{DM}$ .....	12A
Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	125W
Derate Linearly Above $25^\circ C$ .....	1.0W/ $^\circ C$
Gate-to-Source Voltage, $V_{GS}$ .....	$\pm 20$
Single Pulse Avalanche Energy (Note 2), $E_{AS}$ .....	280mJ
Avalanche Current (Note 1), $I_{AR}$ .....	3.1A
Repetitive Avalanche Energy (Note 1), $E_{AR}$ .....	13mJ
Peak Diode Recovery dv/dt (Note 3), dv/dt .....	1.0V/ns
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+150^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ C$
Lead Temperature (During Soldering, 1.6mm from case for 10sec), $T_L$ .....	$+300^\circ C$
Mounting Torque (6-32 or M3 Screw) .....	10 lbf•in (1.1N•m)
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	1.0 $^\circ C/W$
Thermal Resistance, Junction-to-Ambient, $R_{thJA}$ .....	62 $^\circ C/W$
Typical Thermal Resistance, Case-to-Sink (Flat, Greased Surface), $R_{thCS}$ .....	0.5 $^\circ C/W$

Note 1. Repetitive rating; pulse width limited by maximum junction temperature.

Note 2.  $V_{DD} = 50V$ , starting  $T_J = +25^\circ C$ ,  $L = 55mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 3.1A$

Note 3.  $I_{SD} \leq 3.1A$ ,  $di/dt \leq 80A/\mu s$ ,  $V_{DD} \leq 600V$ ,  $T_J \leq +150^\circ C$

Note 4. Pules Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	1000	-	-	V
Breakdown Voltage Temp. Coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_J}$	Reference to $+25^\circ\text{C}$ , $I_D = 1\text{mA}$	-	1.4	-	$V/^\circ\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 1.9A$ , Note 4	-	-	5.0	$\Omega$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Forward Transconductance	$g_{fs}$	$V_{DS} = 100V, I_D = 1.9A$ , Note 4	2.1	-	-	mhos
Drain-to-Source Leakage Current	$I_{DSS}$	$V_{DS} = 1000V, V_{GS} = 0V$	-	-	100	$\mu A$
		$V_{DS} = 800V, V_{GS} = 0V, T_J = +125^\circ\text{C}$	-	-	500	$\mu A$
Gate-to-Source Forward Leakage	$I_{GSS}$	$V_{GS} = -20V$	-	-	-100	nA
Gate-to-Source Reverse Leakage	$I_{GSS}$	$V_{GS} = 20V$	-	-	100	nA
Total Gate Charge	$Q_g$	$I_D = 3.1A, V_{DS} = 400V, V_{GS} = 10V$ , Note 4	-	-	80	nC
Gate-to-Source Charge	$Q_{gs}$		-	-	10	nC
Gate-to-Drain ("Miller") Charge	$Q_{gd}$		-	-	42	nC
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 500V, I_D = 3.1A, R_G = 12\Omega$ , $R_D = 170\Omega$ , Note 4	-	12	-	ns
Rise Time	$t_r$		-	25	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	89	-	ns
Fall Time	$t_f$		-	29	-	ns
Internal Drain Inductance	$L_D$	Between lead, .250in. (6.0) mm from package and center of die contact	-	4.5	-	nH
Internal Source Inductance	$L_S$		-	7.5	-	nH
Input Capacitance	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	-	980	-	pF
Output Capacitance	$C_{oss}$		-	140	-	pF
Reverse Transfer Capacitance	$C_{riss}$		-	50	-	pF

**Source-Drain Ratings and Characteristics:**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Continuous Source Current (Body Diode)	$I_S$		-	-	3.1	A
Pulsed Source Current (Body Diode)	$I_{SM}$	Note 1	-	-	12	A
Diode Forward Voltage	$V_{SD}$	$T_J = +25^\circ\text{C}, I_S = 3.1A, V_{GS} = 0V$ , Note 4	-	-	1.8	V
Reverse Recovery Time	$t_{rr}$	$T_J = +25^\circ\text{C}, I_F = 3.1A$ , $di/dt = 100A/\mu s$ , Note 4	-	410	620	ns
Reverse Recovery Charge	$Q_{rr}$		-	1.3	2.0	$\mu C$
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 4. Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

