

NTE2390 MOSFET N-Channel Enhancement Mode, High Speed Switch

Description:

The NTE2390 is an N-Channel Enhancement Mode Power MOS Field Effect Transistor in a TO220 type package designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid, and relay drivers.

Features:

- Silicon Gate for Fast Switching Speeds
- I_{DSS} , $V_{DC(on)}$, $V_{GS(th)}$, and SOA Specified at Elevated Temperatures.
- Rugged – SOA is Power Dissipation Limited
- Source-to-Drain Diode Characterized for Use With Inductive Loads

Absolute Maximum Ratings:

Drain-Source Voltage, V_{DSS}	60V
Drain-Gate Voltage ($R_{GS} = 1M\Omega$), V_{DGR}	60V
Gate-Source Voltage, V_{GS}	$\pm 20V$
Drain Current, I_D	
Continuous	12A
Pulsed	30A
Total Power Dissipation ($T_C = +25^\circ C$), P_D	75W
Derate Above $25^\circ C$	0.6W/ $^\circ C$
Operating Junction Temperature Range, T_J	-65° to $+150^\circ C$
Storage Temperature Range, T_{stg}	-65° to $+150^\circ C$
Maximum Thermal Resistance, Junction-to-Case, R_{thJC}	1.67 $^\circ C/W$
Maximum Thermal Resistance, Junction-to-Ambient, R_{thJA}	30 $^\circ C/W$
Maximum Lead Temperature (During soldering), T_L	$+275^\circ C$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Drain–Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 0.25\text{mA}$, $V_{GS} = 0$	60	–	–	V
Zero–Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0$, $V_{DS} = \text{Max Rating}$	–	–	0.2	mA
		$V_{GS} = 0$, $V_{DS} = 48\text{V}$, $T_J = +125^{\circ}\text{C}$	–	–	1.0	mA
Gate–Body Leakage Current, Forward	I_{GSSF}	$V_{DS} = 0$, $V_{GSF} = 20\text{V}$	–	–	100	nA
Gate–Body Leakage Current, Reverse	I_{GSSR}	$V_{DS} = 0$, $V_{GSR} = 20\text{V}$	–	–	100	nA
ON Characteristics (Note 1)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 1\text{mA}$	2.0	–	4.5	V
		$V_{DS} = V_{GS}$, $I_D = 1\text{mA}$, $T_J = +100^{\circ}\text{C}$	1.5	–	4.0	V
Static Drain–Source On Resistance	$r_{DS(on)}$	$V_{GS} = 10\text{V}$, $I_D = 6\text{A}$	–	–	0.2	Ω
Drain–Source ON–Voltage	$V_{DS(on)}$	$V_{GS} = 10\text{V}$, $I_D = 12\text{A}$	–	–	3.0	V
		$V_{GS} = 10\text{V}$, $I_D = 6\text{A}$, $T_J = 100^{\circ}\text{C}$	–	–	2.8	V
Forward Transconductance	g_{fs}	$V_{DS} = 15\text{V}$, $I_D = 6\text{A}$	4	–	–	mhos
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25\text{V}$, $V_{GS} = 0$, $f = 1\text{MHz}$	–	–	400	pf
Output Capacitance	C_{oss}		–	–	300	pf
Reverse Transfer Capacitance	C_{rss}		–	–	100	pf
Switching Characteristics ($T_J = +100^{\circ}\text{C}$, Note 1)						
Turn–On Time	$t_{d(on)}$	$V_{DD} = 25\text{V}$, $I_D = 0.5 \text{ Rated } I_D$, $R_{gen} = 50\Omega$	–	–	60	ns
Rise Time	t_r		–	–	160	ns
Turn–Off Delay Time	$t_{d(off)}$		–	–	80	ns
Fall Time	t_f		–	–	110	ns
Total Gate Charge	Q_g	$V_{DS} = 48\text{V}$, $V_{GS} = 10\text{V}$, $I_D = \text{Rated } I_D$	–	13	26	nC
Gate–Source Charge	Q_{gs}		–	6	–	nC
Gate–Drain Charge	Q_{gd}		–	7	–	nC
Source Drain Diode Characteristics (Note 1)						
Forward ON Voltage	V_{SD}	$I_S = \text{Rated } I_D$, $V_{GS} = 0$	–	1.8	3.2	V
Forward Turn–On Time	t_{on}		Limited by stray inductance			
Reverse Recovery Time	t_{rr}		–	300	–	ns
Internal Package Inductance						
Internal Drain Inductance	L_d	Measured from the contact screw on tab to center of die	–	3.5	–	nH
		Measured from the drain lead 0.25" from package to center of die	–	4.5	–	nH
Internal Source Inductance	L_s	Measured from the source lead 0.25" from package to source bond pad	–	7.5	–	nH

Note 1. Pulse test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

