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NTE2388 MOSFET N-Channel Enhancement Mode, High Speed Switch

Description:

The NTE2388 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
- Low $r_{DS(on)}$ to Minimize On-Losses. 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}	200V
Drain-Gate Voltage ($R_{GS} = 20k\Omega$), V_{DGR}	200V
Gate-Source Voltage, V_{GS}	$\pm 20V$
Drain Current, I_D	
Continuous	
$T_C = +25^\circ C$	18A
$T_C = +100^\circ C$	11A
Peak	
$T_C = +25^\circ C$	72A
Total Power Dissipation ($T_C = +25^\circ C$), P_D	125W
Derate Above $25^\circ C$	1W/ $^\circ C$
Maximum Operating Junction Temperature Range, T_J	-55° to $+150^\circ C$
Storage Temperature Range, T_{stg}	-55° to $+150^\circ C$
Maximum Thermal Resistance, Junction-to-Case, R_{thJC}	1 $^\circ C/W$
Maximum Thermal Resistance, Junction-to-Ambient, R_{thJA}	62.5 $^\circ C/W$
Maximum Lead Temperature (During soldering, 1/8" from case for 5sec), T_L	$+300^\circ C$

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	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0$	200	–	–	V
Zero–Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0, V_{DS} = \text{Max Rating}$	–	–	200	μA
		$V_{GS} = 0, V_{DS} = 160\text{V}, T_C = +125^\circ\text{C}$	–	–	1000	μA
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	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2	–	4	V
Static Drain–Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{V}, I_D = 10\text{A}$	–	–	0.18	Ω
On–State Drain Current	$I_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} \geq 3.2\text{V}$	18	–	–	A
Forward Transconductance	g_{fs}	$V_{DS} \geq 3.2\text{V}, I_D = 10\text{A}$	6	–	–	mhos
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 25\text{V}, V_{GS} = 0, f = 1\text{MHz}$	–	–	1600	pf
Output Capacitance	C_{oss}		–	–	750	pf
Reverse Transfer Capacitance	C_{rss}		–	–	300	pf
Switching Characteristics (Note 1)						
Turn–On Time	$t_{d(on)}$	$V_{DD} \square 75\text{V}, I_D = 10\text{A}_{PEAK}, R_g = 4.7\Omega$	–	–	30	ns
Rise Time	t_r		–	–	60	ns
Turn–Off Delay Time	$t_{d(off)}$		–	–	80	ns
Fall Time	t_f		–	–	60	ns
Total Gate Charge	Q_g	$V_{DS} = 160\text{V}, V_{GS} = 10\text{V}, I_D = \text{Rated } I_D$	–	38	60	nC
Gate–Source Charge	Q_{gs}		–	16	–	nC
Gate–Drain Charge	Q_{gd}		–	22	–	nC
Source Drain Diode Characteristics (Note 1)						
Forward ON Voltage	V_{SD}	$I_S = \text{Rated } I_D, V_{GS} = 0$	–	1.8	2.0	V
Forward Turn–On Time	t_{on}		Limited by stray inductance			
Reverse Recovery Time	t_{rr}		–	450	–	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 $\leq 2\%$.

