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NTE2969 MOSFET N-Channel, Enhancement Mode High Speed Switch TO3P Package

Description:

The NTE2969 is an N-channel enhancement mode power field effect transistor in a TO3P type package especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. This device is well suited for use in applications such as a high efficiency switch mode power supply or an electronic lamp ballast on half bridge.

Features:

- 30A, 400V, $R_{DS(on)} = 0.14\Omega @ V_{GS} = 10V$
- Low gate Charge (90nC Typ)
- Low C_{rSS} (60pF Typ)
- Fast Switching
- 100% Avalanche Tested
- Improved dv/dt Capability

Absolute Maximum Ratings: ($T_C = +25^\circ C$ unless otherwise specified)

Drain-Source Voltage, V_{DSS}	400V
Drain Current, I_D	
Continuous	
$T_C = +25^\circ C$	30A
$T_C = +100^\circ C$	19A
Pulsed (Note 1)	120A
Gate-Source Voltage, V_{GS}	$\pm 30V$
Gate Current (Pulsed), I_{GM}	$\pm 1.5A$
Single Pulsed Avalanche Energy (Note 2), E_{AS}	1400mJ
Avalanche Current (Note 1), I_{AS}	30A
Repetitive Avalanche Energy (Note 1), E_{AR}	29mJ
Peak Diode Recovery dv/dt (Note 3), dv/dt	4.5V/ns
Total Power Dissipation ($T_C = +25^\circ C$), P_D	290W
Derate Above $25^\circ C$	2.33W/ $^\circ C$
Operating Junction Temperature Range, T_J	-55° to $+150^\circ C$
Storage Temperature Range, T_{stg}	-55° to $+150^\circ C$
Maximum Lead Temperature (During Soldering, 1/8" from case, 5sec), T_L	$+300^\circ C$
Thermal Resistance:	
Maximum Junction-to-Case, R_{thJC}	0.43 $^\circ C/W$
Typical Case-to-Sink, R_{thCS}	0.24 $^\circ C/W$
Maximum Junction-to-Ambient, R_{thJA}	40 $^\circ C/W$

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

Note 2. $L = 2.7mH$, $I_{AS} = 30A$, $V_{DD} = 50V$, $R_G = 27\Omega$, Starting $T_J = +25^\circ C$.

Note 3. $I_{SD} \leq 30A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = +25^\circ C$.

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	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	400	–	–	V
Breakdown Voltage Temperature Coefficient	$\Delta BV/\Delta T_J$	$I_D = 250\mu A$, Referenced to $+25^\circ\text{C}$	–	0.4	–	$V/^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 400V, V_{GS} = 0$	–	–	1	μA
		$V_{DS} = 320V, T_C = +125^\circ\text{C}$	–	–	10	μA
Gate–Source Leakage Forward	I_{GSSF}	$V_{GS} = 30V, V_{DS} = 0V$	–	–	100	nA
Gate–Source Leakage Reverse	I_{GSSR}	$V_{GS} = -30V, V_{DS} = 0V$	–	–	-100	nA
ON Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	3.0	–	5.0	V
Static Drain–Source ON Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 12.5A$	–	0.107	0.14	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50V, I_D = 15A$, Note 4	–	20	–	mhos
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	–	3400	4400	pF
Output Capacitance	C_{oss}		–	580	750	pF
Reverse Transfer Capacitance	C_{rss}		–	60	80	pF
Switching Characteristics						
Turn–On Delay Time	$t_{d(on)}$	$V_{DD} = 200V, I_D = 30A, R_G = 25\Omega$, Note 4, Note 5	–	80	170	ns
Rise Time	t_r		–	320	650	ns
Turn–Off Delay Time	$t_{d(off)}$		–	190	390	ns
Fall Time	t_f		–	170	350	ns
Total Gate Charge	Q_g	$V_{GS} = 10V, I_D = 30A, V_{DS} = 320V$, Note 4, Note 5	–	90	120	nC
Gate–Source Charge	Q_{gs}		–	22	–	nC
Gate–Drain (“Miller”) Charge	Q_{gd}		–	46	–	nC
Source–Drain Diode Ratings and Characteristics						
Continuous Source Current	I_S	(Body Diode)	–	–	30	A
Pulse Source Current	I_{SM}	(Body Diode)	–	–	120	A
Diode Forward Voltage	V_{SD}	$I_S = 30A, V_{GS} = 0V$	–	–	1.5	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 30A, di_F/dt = 100A/\mu s$, Note 4	–	370	–	ns
Reverse Recovery Charge	Q_{rr}		–	3.9	–	μC

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

Note 4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

Note 5. Essentially independent of operating temperature.

