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## NTE67 MOSFET N-Ch, Enhancement Mode High Speed Switch

### **Description:**

The NTE67 is a TMOS Power FET in a TO220 type package designed for high voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

### **Features:**

- Lower  $R_{DS(ON)}$
- Improved Inductive Ruggedness
- Fast Switching Times
- Lower Input Capacitance
- Extended Safe Operating Area
- Improved High Temperature Reliability

### **Absolute Maximum Ratings:**

Drain-Source Voltage ( $T_J = +25^\circ\text{C}$ to $+150^\circ\text{C}$ ), $V_{DSS}$ .....	400V
Drain-Gate Voltage ( $R_{GS} = 1\text{M}\Omega$ , $T_J = +25^\circ\text{C}$ to $+125^\circ\text{C}$ ), $V_{DGR}$ .....	400V
Gate-Source Voltage, $V_{GS}$ .....	$\pm 20\text{V}$
Continuous Drain Current, $I_D$	
$T_C = +25^\circ\text{C}$ .....	4.5A
$T_C = +100^\circ\text{C}$ .....	3.0A
Pulsed Drain Current (Note 2), $I_{DM}$ .....	18A
Pulsed Gate Current, $I_{GM}$ .....	$\pm 1.5\text{A}$
Single Pulsed Avalanche Energy (Note 3), $E_{AS}$ .....	290mJ
Avalanche Current, $I_{AS}$ .....	5.5A
Total Power Dissipation ( $T_C = +25^\circ\text{C}$ ), $P_D$ .....	75W
Derate Above $25^\circ\text{C}$ .....	0.6W/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+150^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ\text{C}$
Lead Temperature (During Soldering, 1/8" from case, 5sec max.), $T_L$ .....	$+300^\circ\text{C}$
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	1.67K/W
Thermal Resistance, Junction-to-Ambient, $R_{thJA}$ .....	80K/W
Thermal Resistance, Case-to-Sink (Mounting surface flat, smooth, and greased), $R_{thCS}$	0.24K/W

Note 1. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

Note 2. Repetitive rating: Pulse width limited by max, junction temperature.

Note 3.  $L = 17\text{mH}$ ,  $V_{dd} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = +25^\circ\text{C}$ .

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain–Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	400	–	–	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	–	4.0	V
Gate–Source Leakage, Forward	$I_{GSS}$	$V_{GS} = 20V$	–	–	100	nA
Gate–Source Leakage, Reverse	$I_{GSS}$	$V_{GS} = -20V$	–	–	-100	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = \text{Max. Rating}, V_{GS} = 0V$	–	–	250	$\mu A$
		$V_{DS} = \text{Max. Rating} \times 0.8, V_{GS} = 0V, T_C = +125^\circ\text{C}$	–	–	1000	$\mu A$
On–State Drain–Source Current	$I_{D(on)}$	$V_{DS} > I_{D(on)} \times R_{DS(on)} \text{max}, V_{GS} = 10V, \text{Note 1}$	4.5	–	–	A
Static Drain–Source On–State Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 3A, \text{Note 1}$	–	1.0	1.5	$\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} \geq 50V, I_D = 3A, \text{Note 1}$	2.9	4.4	–	mhos
Input Capacitance	$C_{iss}$	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	–	780	–	pF
Output Capacitance	$C_{oss}$		–	99	–	pF
Reverse Transfer Capacitance	$C_{rss}$		–	43	–	pF
Turn–On Delay Time	$t_{d(on)}$	$V_{DD} = 0.5BV_{DSS}, I_D = 5.5A, Z_O = 12\Omega$ (MOSFET switching times are essentially independent of operating temperature)	–	11	17	ns
Rise Time	$t_r$		–	19	29	ns
Turn–Off Delay Time	$t_{d(off)}$		–	37	56	ns
Fall Time	$t_f$		–	16	24	ns
Total Gate Charge (Gate–Source Plus Gate–Drain)	$Q_g$	$V_{GS} = 10V, I_D = 5.5A, V_{DS} = 0.8 \text{ Max. Rating}$ (Gate charge is essentially independent of operating temperature)	–	18	30	nC
Gate–Source Charge	$Q_{gs}$		–	40	–	nC
Gate–Drain (“Miller”) Charge	$Q_{gd}$		–	14	–	nC

Note 1. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

**Source–Drain Diode Ratings and Characteristics:**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Continuous Source Current (Body Diode)	$I_S$		–	–	4.5	A
Pulse Source Current (Body Diode)	$I_{SM}$	Note 2	–	–	18	A
Diode Forward Voltage	$V_{SD}$	$T_C = +25^\circ\text{C}, I_S = 4.5A, V_{GS} = 0V$	–	–	1.6	V
Reverse Recovery Time	$t_{rr}$	$T_J = +25^\circ\text{C}, I_F = 5.5A, di_F/dt = 100A/\mu s$	–	310	660	ns

Note 1. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

Note 2. Repetitive rating: Pulse width limited by max, junction temperature.

