



ELECTRONICS, INC.
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NTE2946 MOSFET N-Channel, Enhancement Mode High Speed Switch

Features:

- Low Static Drain-Source ON Resistance
- Improved Inductive Ruggedness
- Fast Switching Times
- Low Input Capacitance
- Extended Safe Operating Area
- Improved High Temperature Reliability
- TO220 Type Isolated Package

Absolute Maximum Ratings:

Drain-Source Voltage (Note 1), V_{DSS}	500V
Drain-Gate Voltage ($R_{GS} = 1M\Omega$, Note 1), V_{DGR}	500V
Gate-Source Voltage, V_{GS}	$\pm 20V$
Drain Current, I_D	
Continuous	
$T_C = +25^\circ C$	4.6A
$T_C = +100^\circ C$	3.2A
Pulsed (Note 2)	32A
Gate Current (Pulsed), I_{GM}	$\pm 1.5A$
Single Pulsed Avalanche Energy (Note 3), E_{AS}	161mJ
Avalanche Current, I_{AS}	4.6A
Total Power Dissipation ($T_C = +25^\circ C$), P_D	40W
Derate Above $25^\circ C$	0.32W/ $^\circ C$
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}	3.12K/W
Typical Case-to-Sink (Mounting surface flat, smooth, and greased), R_{thCS}	0.5K/W
Maximum Junction-to-Ambient (Free Air Operation), R_{thJA}	62.5K/W

Note 1. $T_J = +25^\circ$ to $+150^\circ C$.

Note 2. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 3. $L = 14mH$, $V_{DD} = 50V$, $R_G = 25\Omega$, 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
Drain–Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	500	–	–	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}	$V_{DS} = \text{Max. Rating}, V_{GS} = 0$	–	–	250	μA
		$V_{DS} = 0.8 \text{ Max. Rating}, T_C = +125^\circ\text{C}$	–	–	1000	μA
Static Drain–Source ON Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 4A, \text{Note 4}$	–	–	0.85	Ω
Forward Transconductance	g_{fs}	$V_{DS} \geq 50V, I_D = 4A, \text{Note 4}$	4.0	6.5	–	mhos
Input Capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	–	1510	–	pF
Output Capacitance	C_{oss}		–	154	–	pF
Reverse Transfer Capacitance	C_{rss}		–	66	–	pF
Turn–On Delay Time	$t_{d(on)}$	$V_{DD} = 0.5 BV_{DSS}, I_D = 8A, Z_O = 9.1\Omega,$ (MOSFET switching times are essentially independent of operating temperature)	–	14	21	ns
Rise Time	t_r		–	23	35	ns
Turn–Off Delay Time	$t_{d(off)}$		–	49	74	ns
Fall Time	t_f		–	20	30	ns
Total Gate Charge (Gate–Source Plus Gate–Drain)	Q_g	$V_{GS} = 10V, I_D = 8A, V_{DS} = 0.8 \text{ Max. Rating},$ (Gate charge is essentially independent of operating temperature)	–	–	74	nC
Gate–Source Charge	Q_{gs}		–	9	–	nC
Gate–Drain (“Miller”) Charge	Q_{gd}		–	27	–	nC
Source–Drain Diode Ratings and Characteristics						
Continuous Source Current	I_S	(Body Diode)	–	–	8	A
Pulse Source Current	I_{SM}	(Body Diode) Note 2	–	–	32	A
Diode Forward Voltage	V_{SD}	$T_J = +25^\circ\text{C}, I_S = 8A, V_{GS} = 0V, \text{Note 4}$	–	–	2	V
Reverse Recovery Time	t_{rr}	$T_J = +25^\circ\text{C}, I_F = 8A, dI_F/dt = 100A/\mu s$	–	460	970	ns

Note 2. Repetitive Rating: Pulse width limited by maximum junction temperature.

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

