



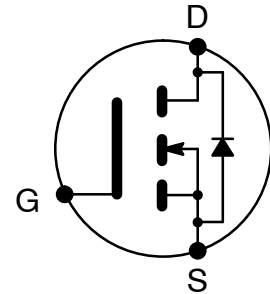
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NTE2904
MOSFET
N-Ch, Enhancement Mode
High Speed Switch
TO-220 Type Package

Features:

- Advanced Process Technology
- Ultra Low On-Resistance
- Dynamic dv/dt Rating
- +175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated



Absolute Maximum Ratings:

Continuous Drain Current ($V_{GS} = 10V$), I_D	
$T_C = +25^\circ C$	64A
$T_C = +100^\circ C$	45A
Pulsed Drain Current (Note 1), I_{DM}	210A
Power Dissipation ($T_C = +25^\circ C$), P_D	7130W
Derate Linearly Above $25^\circ C$	0.83W/ $^\circ C$
Gate-to-Source Voltage, V_{GS}	$\pm 20V$
Avalanche Current (Note 1), I_{AR}	32A
Repetitive Avalanche Energy (Note 1), E_{AR}	13mJ
Peak Diode Recovery dv/dt (Note 3), dv/dt	5.0V/ns
Operating Junction Temperature Range, T_J	-55° to $+175^\circ C$
Storage Temperature Range, T_{stg}	-55° to $+175^\circ C$
Lead Temperature (During Soldering, 1.6mm from case for 10sec), T_L	$+300^\circ C$
Mounting Torque (6-32 or M3 Screw)	10 lbf•in (1.1N•m)
Thermal Resistance, Junction-to-Case, R_{thJC}	1.15 $^\circ C/W$
Thermal Resistance, Junction-to-Ambient, R_{thJA}	62 $^\circ C/W$
Typical Thermal Resistance, Case-to-Sink (Flat, Greased Surface), R_{thCS}	0.5 $^\circ C/W$

Note 1. Repetitive rating; pulse width limited by maximum junction temperature.

Note 2. Starting $T_J = +25^\circ C$, $L = 0.37mH$, $R_G = 25\Omega$, $I_{AS} = 32A$

Note 3. $I_{SD} \leq 32A$, $di/dt \leq 220A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq +175^\circ C$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	55	–	–	V
Breakdown Voltage Temp. Coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_J}$	Reference to $+25^\circ\text{C}$, $I_D = 1\text{mA}$	–	0.058	–	$V/^\circ\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 32A$, Note 4	–	–	0.014	Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	–	4.0	V
Forward Transconductance	g_{fs}	$V_{DS} = 25V, I_D = 32A$, Note 4	24	–	–	mhos
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS} = 55V, V_{GS} = 0V$	–	–	25	μA
		$V_{DS} = 44V, V_{GS} = 0V, T_J = +150^\circ\text{C}$	–	–	250	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS} = 20V$	–	–	100	nA
Gate-to-Source Reverse Leakage	I_{GSS}	$V_{GS} = -20V$	–	–	-100	nA
Total Gate Charge	Q_g	$I_D = 32A, V_{DS} = 44V, V_{GS} = 10V$	–	–	81	nC
Gate-to-Source Charge	Q_{gs}		–	–	19	nC
Gate-to-Drain (“Miller”) Charge	Q_{gd}		–	–	30	nC
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 28V, I_D = 32A, R_G = 0.85\Omega, R_D = 79\ \mu\Omega$, Note 4	–	12	–	ns
Rise Time	t_r		–	78	–	ns
Turn-Off Delay Time	$t_{d(off)}$		–	34	–	ns
Fall Time	t_f		–	50	–	ns
Internal Drain Inductance	L_D	Between lead, .250in. (6.0) mm from package and center of die contact	–	4.5	–	nH
Internal Source Inductance	L_S		–	7.5	–	nH
Input Capacitance	C_{iss}	$V_{GS} = 0V, V_{DS} = 25V, f = 1\text{MHz}$	–	1970	–	pF
Output Capacitance	C_{oss}		–	470	–	pF
Reverse Transfer Capacitance	C_{rss}		–	120	–	pF
Single Pulse Avalanche Energy	E_{AS}	$I_{AS} = 32A, L = 0.37\text{mH}$, Note 2	–	700 Note 5	190 Note 6	mJ

Source-Drain Ratings and Characteristics:

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Continuous Source Current (Body Diode)	I_S		–	–	64	A
Pulsed Source Current (Body Diode)	I_{SM}	Note 1	–	–	210	A
Diode Forward Voltage	V_{SD}	$T_J = +25^\circ\text{C}, I_S = 32A, V_{GS} = 0V$, Note 4	–	–	1.3	V
Reverse Recovery Time	t_{rr}	$T_J = +25^\circ\text{C}, I_F = 32A, di/dt = 100A/\mu s$, Note 4	–	68	100	ns
Reverse Recovery Charge	Q_{rr}		–	220	330	μC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S + L_D$)				

Note 1. Repetitive rating; pulse width limited by maximum junction temperature.

Note 4. Pulse width $\leq 400\mu s$; duty cycle $\leq 2\%$.

Note 5. This is the destructive value not limited to the thermal limit.

Note 6. This is the thermal limited value.



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