

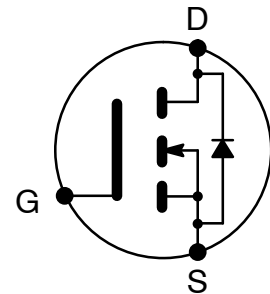


ELECTRONICS, INC.  
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**NTE2993**  
**MOSFET**  
**N-Channel, Enhancement Mode**  
**High Speed Switch**  
**TO3 Type Package**

**Features:**

- Repetitive Avalanche Ratings
- Dynamic dv/dt Rating
- Simple Drive Requirements
- Ease of Paralleling



**Absolute Maximum Ratings:**

Drain-Source Voltage ( $V_{GS} = 0V, I_D = 1mA$ ), $V_{DSS}$ .....	400V
Gate-Source Voltage, $V_{GS}$ .....	$\pm 20V$
Continuous Drain Current ( $V_{GS} = 10V$ ), $I_D$	
$T_C = +25^\circ C$ .....	14A
$T_C = +100^\circ C$ .....	9A
Pulsed Drain Current (Note 1), $I_{DM}$ .....	56A
Maximum Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	150W
Linear Derating Factor .....	1.2W/ $^\circ C$
Single Pulse Avalanche Energy (Note 2), $E_{AS}$ .....	11.3mJ
Avalanche Current (Note 1), $I_{AR}$ .....	14A
Repetitive Avalanche Energy (Note 1), $E_{AR}$ .....	15mJ
Peak Diode Recovery (Note 3), dv/dt .....	4.0V/ns
Operating Junction Temperature Range, $T_J$ .....	$-55^\circ$ to $+150^\circ C$
Storage Temperature Range, $T_{stg}$ .....	$-55^\circ$ to $+150^\circ C$
Lead temperature (During Soldering, .063" (1.6mm) from case, 10sec max), $T_L$ .....	$+300^\circ C$
Thermal Resistance, Junction-to-Ambient (Typical Socket Mount), $R_{thJA}$ .....	30K/W
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	0.83K/W

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

Note 2.  $V_{DD} = 50V$ , Starting  $T_J = +150^\circ C$ , Peak  $I_L = 14A$ .

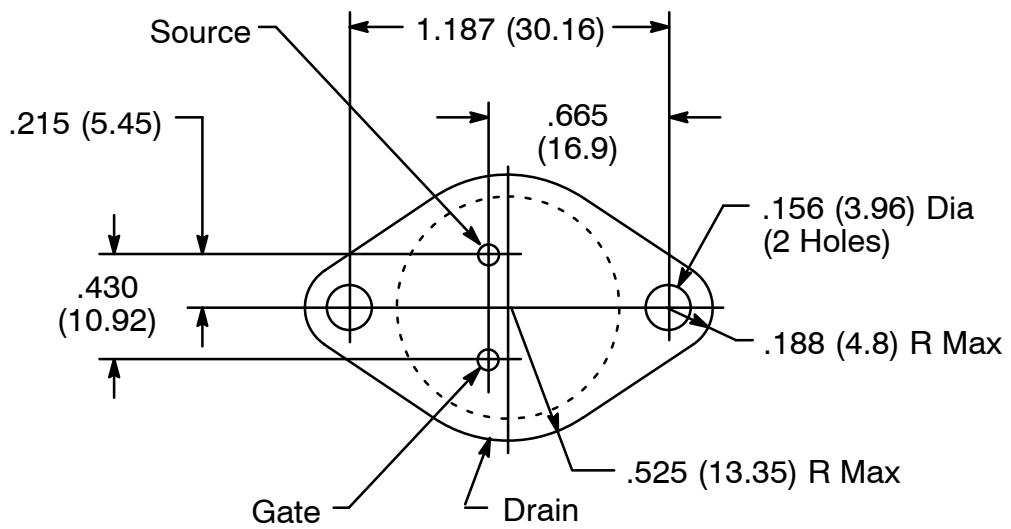
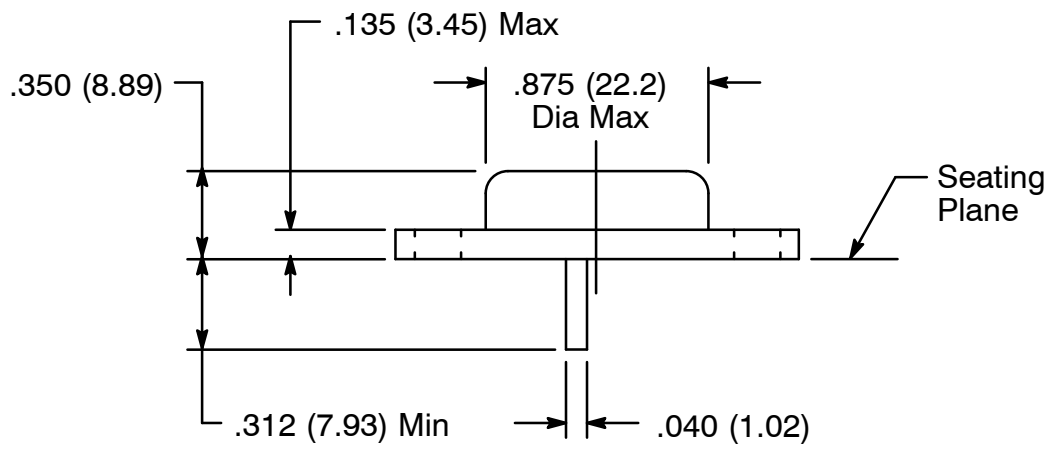
Note 3.  $I_{SD} \leq 14A$ ,  $di/dt \leq 145A/^\circ s$ ,  $V_{DD} \leq 400V$ ,  $T_J \leq +150^\circ C$ .

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain–Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 1\text{mA}, V_{GS} = 0\text{V}$	400	–	–	V
Temperature Coefficient of Breakdown Voltage	$\pm V_{(BR)DSS} / \pm T_J$	Reference to $+25^\circ\text{C}, I_D = 1\text{mA}$	–	0.46	–	$\text{V}/^\circ\text{C}$
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250^\circ\text{A}$	2.0	–	4.0	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 320$	–	–	25	$^\circ\text{A}$
		$V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$	–	–	250	$^\circ\text{A}$
On–State Drain Current	$I_{D(on)}$	$V_{DS} > I_{D(on)} \times R_{DS(on)} \text{ max}, V_{GS} = 10\text{V}$	15	–	–	A
Gate–Source Leakage Forward	$I_{GSS}$	$V_{GS} = 20\text{V}$	–	–	100	nA
Gate–Source Leakage Reverse	$I_{GSS}$	$V_{GS} = -20\text{V}$	–	–	-100	nA
Drain–Source On–State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{V}, I_D = 9\text{A}, \text{ Note 4}$	–	–	0.3	$\leq$
		$V_{GS} = 10\text{V}, I_D = 14\text{A}, \text{ Note 4}$	–	–	0.4	$\leq$
Forward Transconductance	$g_{fs}$	$I_D = 3\text{A}, V_{DS} = 10\text{V}, \text{ Note 4}$	6.0	–	–	S
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{V}, V_{DS} = 25\text{V}, f = 1.0\text{MHz}$	–	2600	–	pF
Output Capacitance	$C_{oss}$		–	680	–	pF
Reverse Transfer Capacitance	$C_{rss}$		–	250	–	pF
Turn–On Time	$t_{d(on)}$	$V_{DD} = 200\text{V}, I_D = 14\text{A}, R_G = 2.35\leq$	–	–	35	ns
Rise Time	$t_r$		–	–	190	ns
Turn–Off Time	$t_{d(off)}$		–	–	170	ns
Fall Time	$t_f$		–	–	130	ns
Total Gate Charge	$Q_g$	$V_{GS} = 10\text{V}, I_D = 14\text{A}, V_{DS} = 200\text{V}$	52	–	110	nC
Gate–Source Charge	$Q_{gs}$		5.0	–	18	nC
Gate–Drain (“Miller”) Charge	$Q_{gd}$		25	–	65	nC
Internal Drain Inductance	$L_S + L_D$	Measured between the contact screw on header that is closer to source and gate pins and center of die.	–	6.1	–	nH
<b>Source–Drain Diode Ratings and Characteristics:</b>						
Continuous Source Current	$I_S$		–	–	14	A
Pulse Source Current	$I_{SM}$	Note 1	–	–	56	A
Diode Forward Voltage	$V_{SD}$	$T_J = +25^\circ\text{C}, I_S = 14\text{A}, V_{GS} = 0\text{V}, \text{ Note 4}$	–	–	1.7	V
Reverse Recovery Time	$t_{rr}$	$T_J = +25^\circ\text{C}, I_F = 14\text{A}, di/dt \leq 100\text{A}/^\circ\text{s}, V_{DD} \leq 50\text{V}, \text{ Note 4}$	–	–	1200	ns
Reverse Recovered Charge	$Q_{RR}$		–	–	250	$^\circ\text{c}$
Forward Turn–on Time	$t_{on}$	Intrinsic turn–on time is negligible. Turn–on speed is substantially controlled by $L_S + L_D$ .				

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

Note 4. Pulse width  $\leq 300^\circ\text{s}$ , Duty Cycle 2%.



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