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NTE2970
MOSFET
N–Channel, Enhancement Mode
High Speed Switch
TO–247 Type Package

Features:

- Low Gate Charge Q_g Results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current

Applications:

- Switch Mode Power Supply (SMPS)
- Uninterruptable Power Supply
- High Speed Power Switching

Typical SMPS Topologies:

- Full Bridge Converters
- Power factor Correction Boost

Absolute Maximum Ratings: (T_C = +25°C unless otherwise specified)

Drain–Source Voltage, V_{DS} 500V
Gate–Source Voltage, V_{GS} . . . . . ±30V
Continuous Drain Current (V_{GS} = 10V), I_D
T_C = +25°C 22A
T_C = +100°C 14A
Pulsed Drain Current (Note 1), I_{DM} 88A
Single Pulsed Avalanche Energy (Note 2), E_{AS} 1180mJ
Repetitive Avalanche Current (Note 1), I_{AR} 22A
Repetitive Avalanche Energy (Note 1), E_{AR} 28mJ
Total Power Dissipation (T_C = +25°C), P_D 277W
Linear Derating Factor . . . . . 2.2W/°C
Peak Diode Recovery dV/dt (Note 3), dV/dt 4.8V/ns
Operating Junction Temperature Range, T_J . . . . . –55° to +150°C
Storage Temperature Range, T_{stg} . . . . . –55° to +150°C
Lead Temperature (During Soldering, 1.6mm from case, 10 sec.), T_L . . . . . +300°C
Maximum Thermal Resistance, Junction–to–Case (Drain), R_{thJC} . . . . . 0.45°C/W
Typical Thermal Resistance, Case–to–Sink (Flat, Greased Surface), R_{thCS} . . . . . 0.24°C/W
Maximum Thermal Resistance, Junction–to–Ambient, R_{thJA} . . . . . 40°C/W
Mounting Torque (6–32 or M3 Screw) . . . . . 10 lbf • in (1.1 N • m)

Note 1. Repetitive Rating: Pulse Width limited by Maximum Junction Temperature.
Note 2. Starting T_J = +25°C, L = 4.87mH, I_{AS} = 22A, R_G = 25Ω.
Note 3. $I_{SD} \le 22A$, $di/dt \le 190A/\mu s$, $V_{DD} \le V_{DS}$, $T_J \le +150°C$.

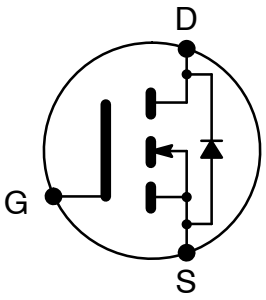
Electrical Characteristics: (T_J = +25°C unless otherwise specified)

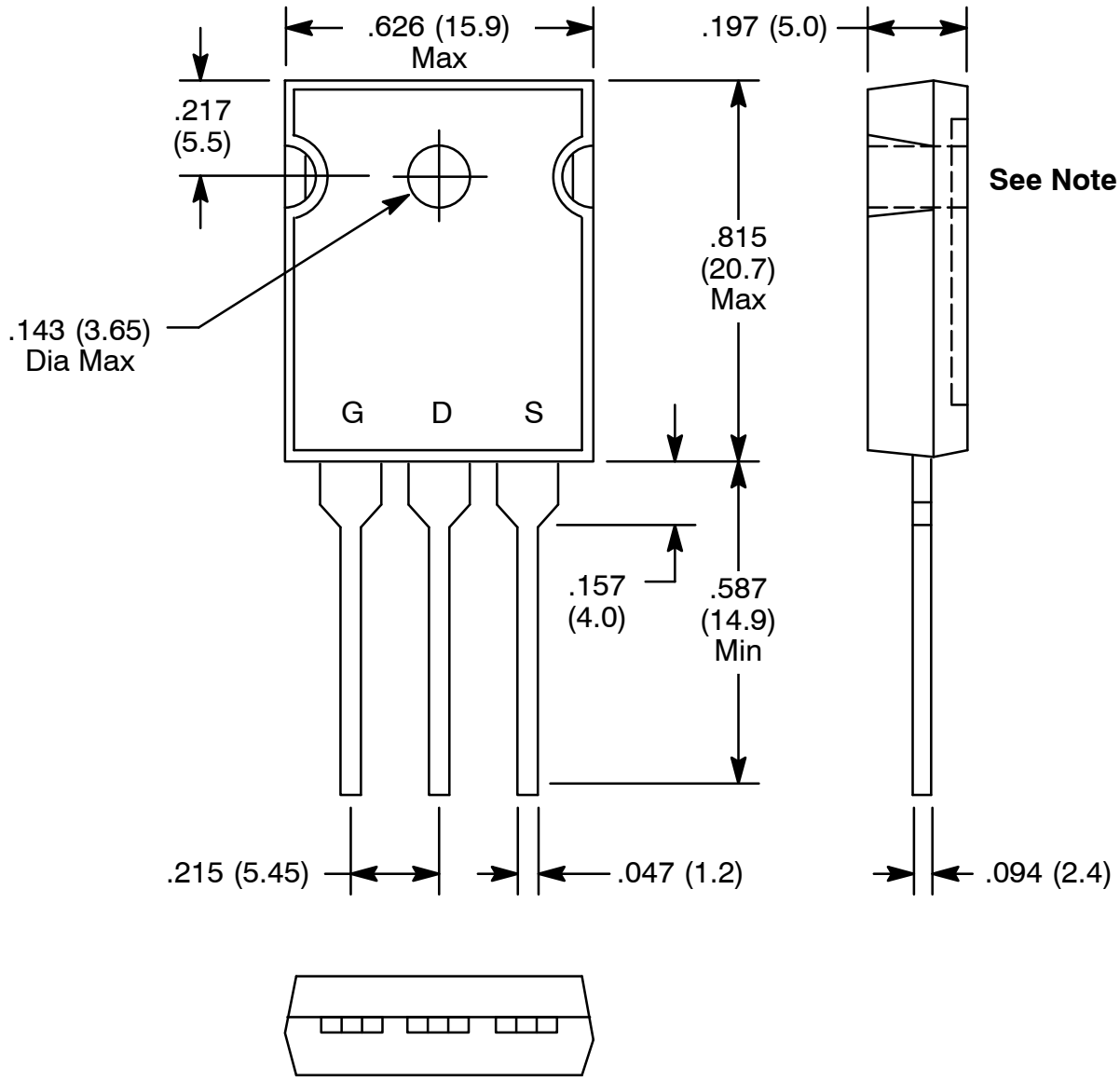
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain–Source Breakdown Voltage	V_{DS}	V_{GS} = 0V, I_D = 250μA	500	–	–	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Referenced to +25°C, I_D = 1mA	–	0.55	–	V/°C
Gate–Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0	–	4.0	V
Gate–Source Leakage	I_{GSS}	V_{GS} = ±30V	–	–	±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 500V, V_{GS} = 0V	–	–	25	μA
		V_{DS} = 400V, V_{GS} = 0V, T_C = +125°C	–	–	250	μA
Drain–Source ON Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 13A, Note 4	–	–	0.23	Ω
Forward Transconductance	g_{fs}	V_{DS} = 50V, I_D = 13A, Note 4	12	–	–	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz	–	3450	–	pF
Output Capacitance	C_{oss}		–	513	–	pF
Reverse Transfer Capacitance	C_{rss}		–	27	–	pF
Output Capacitance	C_{oss}	V_{GS} = 0V, V_{DS} = 1V, f = 1MHz	–	4935	–	pF
		V_{GS} = 0V, V_{DS} = 400V, f = 1MHz	–	137	–	pF
Effective Output Capacitance	C_{oss}eff.	V_{GS} = 0V, V_{DS} = 0V to 400V, Note 5	–	264	–	pF
Turn–On Delay Time	$t_{d(on)}$	V_{DD} = 250V, I_D = 22A, R_G = 4.3Ω, R_D = 11Ω, Note 4	–	26	–	ns
Rise Time	t_r		–	94	–	ns
Turn–Off Delay Time	$t_{d(off)}$		–	47	–	ns
Fall Time	t_f		–	47	–	ns
Total Gate Charge	Q_g	V_{DS} = 400V, V_{GS} = 10V, I_D = 22A, Note 4	–	–	120	nC
Gate–Source Charge	Q_{gs}		–	–	32	nC
Gate–Drain (Miller) Charge	Q_{gd}		–	–	52	nC
Source–Drain Diode Ratings and Characteristics						
Continuous Source Current	I_S	Integral Reverse PN–Diode in the MOSFET	–	–	22	A
Pulsed Source Current (Note 1)	I_{SM}		–	–	88	A
Diode Forward Voltage	V_{SD}	T_J = +25°C, I_S = 22A, V_{GS} = 0V, Note 4	–	–	1.5	V
Reverse Recovery Time	t_{rr}	T_J = +25°C, I_F = 22A, dI/dt = 100A/μs, Note 4	–	570	850	ns
Reverse Recovery Charge	Q_{rr}		–	6.1	9.2	μC
Forward Turn–On Time	t_{on}	Intrinsic turn–on time is negligible (turn–on is dominated by L_S and L_D)				

Note 1. Repetitive Rating: Pulse Width limited by Maximum Junction Temperature.

Note 4. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

Note 5. C_{oss} eff. Is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0% to 80% V_{DS}..





Note: Pin2 connected to metal part of mounting surface.