

**Designer's Data Sheet**  
**Power Field Effect Transistor**  
**N-Channel Enhancement-Mode**  
**Silicon Gate**

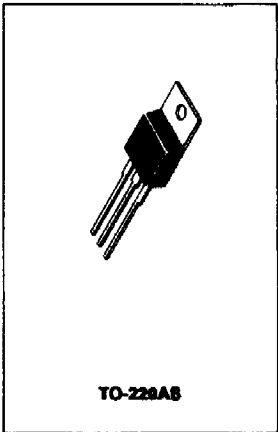
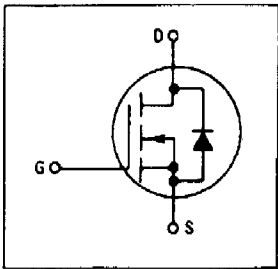
This TMOS Power FET is designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- Silicon Gate for Fast Switching Speeds — Switching Times Specified at 100°C
- Designer's Data —  $I_{DSS}$ ,  $V_{DS(on)}$ ,  $V_{GS(th)}$  and SOA Specified at Elevated Temperature
- Rugged — SOA is Power Dissipation Limited
- Source-to-Drain Diode Characterized for Use With Inductive Loads



**MTP15N05E**

**TMOS POWER FET**  
**15 AMPERES**  
 $R_{DS(on)} = 0.1 \text{ OHM}$   
**50 VOLTS**



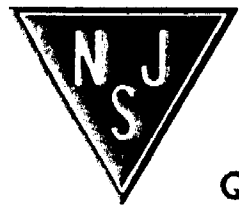
**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	50	Vdc
Drain-Gate Voltage ( $R_{GS} = 1 \text{ M}\Omega$ )	$V_{DGR}$	50	Vdc
Gate-Source Voltage — Continuous — Non-repetitive ( $t_p \leq 50 \mu s$ )	$V_{GS}$ $V_{GSM}$	$\pm 20$ $\pm 40$	Vdc Vpk
Drain Current — Continuous — Pulsed	$I_D$ $I_{DM}$	15 40	Adc
Total Power Dissipation @ $T_C = 25^\circ C$ Derate above $25^\circ C$	$P_D$	75 0.6	Watts W/°C
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to 150	°C

**THERMAL CHARACTERISTICS**

Thermal Resistance Junction to Case	$R_{\theta JC}$	1.67	°C/W
		Junction to Ambient	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	$T_L$	260	°C

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## MTP15N05E

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit	
<b>OFF CHARACTERISTICS</b>					
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 0.25 mA)	V(BR)DSS	50	—	Vdc	
Zero Gate Voltage Drain Current (V <sub>DS</sub> = Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0) (V <sub>DS</sub> = Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0, T <sub>J</sub> = 125°C)	I <sub>DSS</sub>	— —	10 100	μAdc	
Gate-Body Leakage Current, Forward (V <sub>GSF</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSF</sub>	—	100	nAdc	
Gate-Body Leakage Current, Reverse (V <sub>GSR</sub> = 20 Vdc, V <sub>DS</sub> = 0)	I <sub>GSSR</sub>	—	100	nAdc	
<b>ON CHARACTERISTICS*</b>					
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1 mA) T <sub>J</sub> = 100°C	V <sub>GS(th)</sub>	2 1.5	4.5 4	Vdc	
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 7.5 Adc)	R <sub>DS(on)</sub>	—	0.1	Ohm	
Drain-Source On-Voltage (V <sub>GS</sub> = 10 V) (I <sub>D</sub> = 15 Adc) (I <sub>D</sub> = 7.5 Adc, T <sub>J</sub> = 100°C)	V <sub>DS(on)</sub>	— —	2.9 2.4	Vdc	
Forward Transconductance (V <sub>DS</sub> = 15 V, I <sub>D</sub> = 7.5 A)	g <sub>FS</sub>	3.5	—	mhos	
<b>DYNAMIC CHARACTERISTICS</b>					
Input Capacitance	(V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0, f = 1 MHz) See Figure 11	C <sub>iss</sub>	—	700	pF
Output Capacitance		C <sub>oss</sub>	—	400	
Reverse Transfer Capacitance		C <sub>rss</sub>	—	200	
<b>SWITCHING CHARACTERISTICS* (T<sub>J</sub> = 100°C)</b>					
Turn-On Delay Time	(V <sub>DD</sub> = 25 V, I <sub>D</sub> = 0.5 Rated I <sub>D</sub> R <sub>gen</sub> = 50 ohms) See Figures 9, 13 and 14	t <sub>d(on)</sub>	—	50	ns
Rise Time		t <sub>r</sub>	—	150	
Turn-Off Delay Time		t <sub>d(off)</sub>	—	200	
Fall Time		t <sub>f</sub>	—	100	
Total Gate Charge	(V <sub>DS</sub> = 0.8 Rated V <sub>DSS</sub> , I <sub>D</sub> = Rated I <sub>D</sub> , V <sub>GS</sub> = 10 V) See Figure 12	Q <sub>g</sub>	17 (Typ)	35	nC
Gate-Source Charge		Q <sub>gs</sub>	8 (Typ)	—	
Gate-Drain Charge		Q <sub>gd</sub>	9 (Typ)	—	
<b>SOURCE DRAIN DIODE CHARACTERISTICS*</b>					
Forward On-Voltage	(I <sub>S</sub> = Rated I <sub>D</sub> V <sub>GS</sub> = 0)	V <sub>SD</sub>	1.8 (Typ)	2.5	Vdc
Forward Turn-On Time		t <sub>on</sub>	Limited by stray inductance		
Reverse Recovery Time		t <sub>rr</sub>	320 (Typ)	—	ns
<b>INTERNAL PACKAGE INDUCTANCE</b>					
Internal Drain Inductance (Measured from the contact screw on tab to center of die) (Measured from the drain lead 0.25" from package to center of die)	L <sub>d</sub>	3.5 (Typ) 4.5 (Typ)	— —	—	nH
Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad)	L <sub>s</sub>	7.5 (Typ)	—	—	nH

\*Pulse Test Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%