

Designer's Data Sheet

Power Field Effect Transistor

N-Channel Enhancement-Mode Silicon Gate

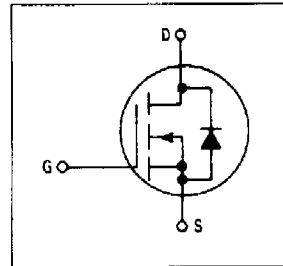
These TMOS Power FETs are designed for medium voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- 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



MTM12N10
***MTP12N10E**

TMOS POWER FETs
12 AMPERES
 $R_{DS(on)} = 0.18 \text{ OHM}$
100 VOLTS

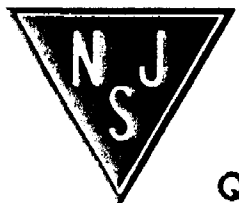
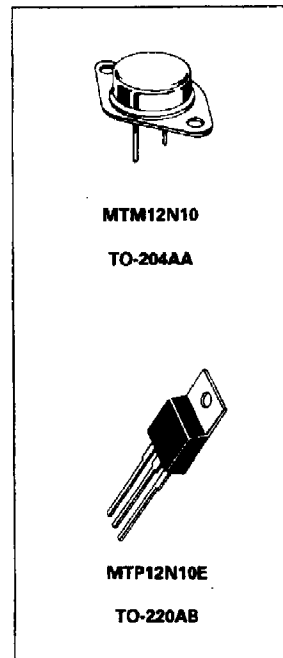


MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	100	Vdc
Drain-Gate Voltage ($R_{GS} = 1 \text{ M}\Omega$)	V_{DGR}	100	Vdc
Gate-Source Voltage	V_{GS}	± 20	Vdc
Continuous	V_{GSM}	± 40	Vpk
Non-repetitive ($t_p \leq 50 \mu\text{s}$)			
Drain Current — Continuous	I_D	12	Adc
— Pulsed	I_{DM}	30	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	75	Watts
Derate above 25°C		0.6	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	TO-204	$R_{\theta JA}$	30	
	TO-220		62.5	
Maximum Lead Temperature for Soldering	TO-220	T_L	260	°C
Purposes, 1/8" from case for 5 seconds	TO-204		300	



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ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ($V_{GS} = 0, I_D = 0.25 \text{ mA}$)	$V_{(BR)DSS}$	100	—	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = \text{Rated } V_{DSS}, V_{GS} = 0$) ($V_{DS} = \text{Rated } V_{DSS}, V_{GS} = 0, T_J = 125^\circ\text{C}$)	I_{DSS}	— —	10 100	μAdc
Gate-Body Leakage Current, Forward ($V_{GSF} = 20 \text{ Vdc}, V_{DS} = 0$)	I_{GSSF}	—	100	nAdc
Gate-Body Leakage Current, Reverse ($V_{GSR} = 20 \text{ Vdc}, V_{DS} = 0$)	I_{GSSR}	—	100	nAdc

ON CHARACTERISTICS*

Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 1 \text{ mA}$) $T_J = 100^\circ\text{C}$	$V_{GS(th)}$	2 1.5	4.5 4	Vdc
Static Drain-Source On-Resistance ($V_{GS} = 10 \text{ Vdc}, I_D = 6 \text{ Adc}$)	$R_{DS(on)}$	—	0.18	Ohm
Drain-Source On-Voltage ($V_{GS} = 10 \text{ V}$) ($I_D = 12 \text{ Adc}$) ($I_D = 6 \text{ Adc}, T_J = 100^\circ\text{C}$)	$V_{DS(on)}$	— —	2.6 2.2	Vdc
Forward Transconductance ($V_{DS} = 15 \text{ V}, I_D = 6 \text{ A}$)	g_{FS}	3	—	mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	($V_{DS} = 25 \text{ V}, V_{GS} = 0,$ $f = 1 \text{ MHz}$) See Figure 11	C_{iss}	—	800	pF
Output Capacitance		C_{oss}	—	400	
Reverse Transfer Capacitance		C_{rss}	—	100	

SWITCHING CHARACTERISTICS* ($T_J = 100^\circ\text{C}$)

Turn-On Delay Time	($V_{DD} = 25 \text{ V}, I_D = 0.5 \text{ Rated } I_D$ $R_{gen} = 50 \text{ ohms}$) See Figures 9, 13 and 14	$t_{d(on)}$	—	50	ns
Rise Time		t_r	—	150	
Turn-Off Delay Time		$t_{d(off)}$	—	200	
Fall Time		t_f	—	100	
Total Gate Charge	($V_{DS} = 0.8 \text{ Rated } V_{DSS},$ $I_D = \text{Rated } I_D, V_{GS} = 10 \text{ V}$) See Figure 12	Q_g	17 (Typ)	36	nC
Gate-Source Charge		Q_{gs}	8 (Typ)	—	
Gate-Drain Charge		Q_{gd}	9 (Typ)	—	

SOURCE DRAIN DIODE CHARACTERISTICS*

Forward On-Voltage	($I_S = \text{Rated } I_D$ $V_{GS} = 0$)	V_{SD}	1.2 (Typ)	2.5	Vdc
Forward Turn-On Time		t_{on}	Limited by stray inductance		
Reverse Recovery Time		t_{rr}	325 (Typ)	—	ns

INTERNAL PACKAGE INDUCTANCE (TO-204)

Internal Drain Inductance (Measured from the contact screw on the header closer to the source pin and the center of the die)	L_d	5 (Typ)	—	nH
Internal Source Inductance (Measured from the source pin, 0.25" from the package to the source bond pad)	L_s	12.5 (Typ)	—	

INTERNAL PACKAGE INDUCTANCE (TO-220)

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_d	3.5 (Typ) 4.5 (Typ)	— —	nH
Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad.)	L_s	7.5 (Typ)	—	

*Pulse Test. Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$