

## Power Field Effect Transistor N-Channel Enhancement-Mode Silicon Gate

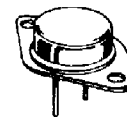
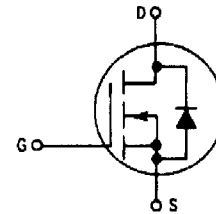
This TMOS Power FET is designed for high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- 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



**MTM25N10**

TMOS POWER FET  
25 AMPERES  
 $R_{DS(on)} = 0.075 \text{ OHM}$   
100 VOLTS



TO-204AE

### 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 Continuous Non-repetitive ( $t_p \leq 50 \mu\text{s}$ )	$V_{GS}$ $V_{GSM}$	$\pm 20$ $\pm 40$	Vdc Vpk
Drain Current — Continuous — Pulsed	$I_D$ $I_{DM}$	25 105	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	150 1.2	Watts W/°C
Operating and Storage Temperature Range	$T_J, T_{stg}$	-65 to 150	°C

### THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	0.83 30	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	$T_L$	300	°C

### 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	$\mu\text{Adc}$
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

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

Characteristic	Symbol	Min	Max	Unit
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**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 ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 12.5\text{ Adc}$ )	$R_{DS(on)}$	—	0.075	Ohm
Drain-Source On-Voltage ( $V_{GS} = 10\text{ V}$ ) ( $I_D = 25\text{ Adc}$ ) ( $I_D = 12.5\text{ Adc}$ , $T_J = 100^\circ\text{C}$ )	$V_{DS(on)}$	— —	2.25 1.8	Vdc
Forward Transconductance ( $V_{DS} = 10\text{ V}$ , $I_D = 12.5\text{ A}$ )	$g_{FS}$	5	—	mhos

**DYNAMIC CHARACTERISTICS**

Input Capacitance	( $V_{DS} = 25\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ ) See Figure 11	$C_{iss}$	—	2000	pF
Output Capacitance		$C_{oss}$	—	1500	
Reverse Transfer Capacitance		$C_{rss}$	—	400	

**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	$t_{d(on)}$	—	60	ns
Rise Time		$t_r$	—	450	
Turn-Off Delay Time		$t_{d(off)}$	—	150	
Fall Time		$t_f$	—	300	
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	$Q_g$	29 (Typ)	40	nC
Gate-Source Charge		$Q_{gs}$	23 (Typ)	—	
Gate-Drain Charge		$Q_{gd}$	6 (Typ)	—	

**SOURCE DRAIN DIODE CHARACTERISTICS\***

Forward On-Voltage	( $I_S = \text{Rated } I_D$ $V_{GS} = 0$ )	$V_{SD}$	1.5 (Typ)	1.8	Vdc
Forward Turn-On Time		$t_{on}$	Limited by stray inductance		
Reverse Recovery Time		$t_{rr}$	450 (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)	—	