*New Jersey Semi-Conductor Products, Inc.*

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**MTM12P05**
**MTM12P06**
**MTM12P08**
**MTM12P10**
**MTP12P05**
**MTP12P06**
**MTP12P08**
**MTP12P10**

*Designer's Data Sheet*

# Power Field Effect Transistor

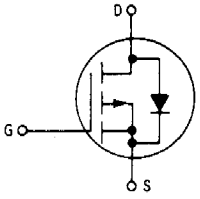
## P-Channel Enhancement-Mode Silicon Gate TMOS

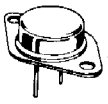
These TMOS Power FETs are designed for medium voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- 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

TMOS™

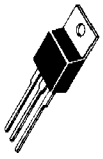
**TMOS POWER FETs**
**12 AMPERES**
**$r_{DS(on)}$ = 0.3 OHM**
**50, 60, 80 and 100 VOLTS**



**MTM12P05**
**MTM12P06**
**MTM12P08**
**MTM12P10**

**TO-204AA**



**MTP12P05**
**MTP12P06**
**MTP12P08**
**MTP12P10**

**TO-220AB**

**MAXIMUM RATINGS**

| Rating | Symbol | MTM OR MTP | | | | Unit |
|---|---|---|---|---|---|---|
| | | 12P05 | 12P06 | 12P08 | 12P10 | |
| Drain-Source Voltage | $V_{DSS}$ | 50 | 60 | 80 | 100 | Vdc |
| Drain-Gate Voltage ($R_{GS}$ = 1 MΩ) | $V_{DGR}$ | 50 | 60 | 80 | 100 | Vdc |
| Gate-Source Voltage — Continuous | $V_{GS}$ | ±20 | | | | Vdc |
| — Non-repetitive ($t_p \leq 50\ \mu s$) | $V_{GSM}$ | ±40 | | | | Vpk |
| Drain Current | | | | | | Adc |
| Continuous | $I_D$ | 12 | | | | |
| Pulsed | $I_{DM}$ | 28 | | | | |
| Total Power Dissipation @ $T_C$ = 25°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 Purposes, 1/8" from case for 5 seconds | | $T_L$ | 275 | °C |

**Quality Semi-Conductors**

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## MTM/MTP12P05, 06, 08, 10

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Drain-Source Breakdown Voltage ($V_{GS}$ = 0, $I_D$ = 0.25 mA) | MTM/MTP12P05 | $V_{(BR)DSS}$ | 50 | — | Vdc |
| | MTM/MTP12P06 | | 60 | — | |
| | MTM/MTP12P08 | | 80 | — | |
| | MTM/MTP12P10 | | 100 | — | |
| Zero Gate Voltage Drain Current ($V_{DS}$ = Rated $V_{DSS}$, $V_{GS}$ = 0) | | $I_{DSS}$ | — | 10 | μAdc |
| ($V_{DS}$ = Rated $V_{DSS}$, $V_{GS}$ = 0, $T_J$ = 125°C) | | | — | 100 | |
| Gate-Body Leakage Current, Forward ($V_{GSF}$ = 20 Vdc, $V_{DS}$ = 0) | | $I_{GSSF}$ | — | 100 | nAdc |
| Gate-Body Leakage Current, Reverse ($V_{GSR}$ = 20 Vdc, $V_{DS}$ = 0) | | $I_{GSSR}$ | — | 100 | nAdc |
| **ON CHARACTERISTICS*** | | | | | |
| Gate Threshold Voltage ($V_{DS}$ = $V_{GS}$, $I_D$ = 1 mA) | | $V_{GS(th)}$ | 2 | 4.5 | Vdc |
| $T_J$ = 100°C | | | 1.5 | 4 | |
| Static Drain-Source On-Resistance ($V_{GS}$ = 10 Vdc, $I_D$ = 6 Adc) | | $r_{DS(on)}$ | — | 0.3 | Ohm |
| Drain-Source On-Voltage ($V_{GS}$ = 10 V) | | $V_{DS(on)}$ | | | Vdc |
| ($I_D$ = 12 Adc) | | | — | 4.2 | |
| ($I_D$ = 6 Adc, $T_J$ = 100°C) | | | — | 3.8 | |
| Forward Transconductance ($V_{DS}$ = 15 V, $I_D$ = 6 A) | | $g_{FS}$ | 2 | — | mhos |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Input Capacitance | ($V_{DS}$ = 25 V, $V_{GS}$ = 0, f = 1 MHz) See Figure 10 | $C_{iss}$ | — | 920 | pF |
| Output Capacitance | | $C_{oss}$ | — | 575 | |
| Reverse Transfer Capacitance | | $C_{rss}$ | — | 200 | |
| **SWITCHING CHARACTERISTICS*** ($T_J$ = 100°C) | | | | | |
| Turn-On Delay Time | ($V_{DD}$ = 25 V, $I_D$ = 0.5 Rated $I_D$, $R_{gen}$ = 50 ohms) See Figures 12 and 13 | $t_{d(on)}$ | — | 50 | ns |
| Rise Time | | $t_r$ | — | 150 | |
| Turn-Off Delay Time | | $t_{d(off)}$ | — | 150 | |
| Fall Time | | $t_f$ | — | 150 | |
| Total Gate Charge | ($V_{DS}$ = 0.8 Rated $V_{DSS}$, $I_D$ = Rated $I_D$, $V_{GS}$ = 10 V) See Figure 11 | $Q_g$ | 33 (Typ) | 50 | nC |
| Gate-Source Charge | | $Q_{gs}$ | 16 (Typ) | — | |
| Gate-Drain Charge | | $Q_{gd}$ | 17 (Typ) | — | |
| **SOURCE DRAIN DIODE CHARACTERISTICS*** | | | | | |
| Forward On-Voltage | ($I_S$ = Rated $I_D$, $V_{GS}$ = 0) | $V_{SD}$ | 4 (Typ) | 5.5 | Vdc |
| Forward Turn-On Time | | $t_{on}$ | Limited by stray inductance | | |
| Reverse Recovery Time | | $t_{rr}$ | 300 (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 | | $L_d$ | | | nH |
| (Measured from the contact screw on tab to center of die) | | | 3.5 (Typ) | — | |
| (Measured from the drain lead 0.25" from package to center of die) | | | 4.5 (Typ) | — | |
| 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 ≤ 300 μs, Duty Cycle ≤ 2%.