

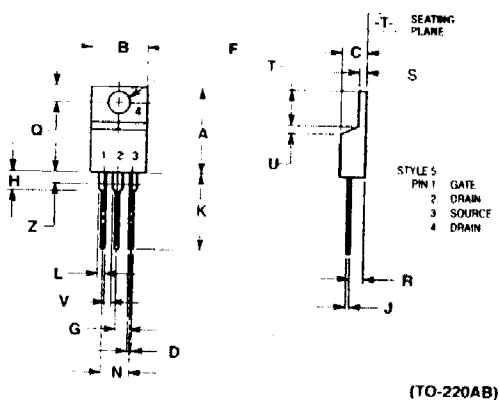
**MTP12N20**  
**Power Field Effect Transistor**  
**N-Channel Enhancement-Mode**  
**Silicon Gate**

**MAXIMUM RATINGS**

| Rating  | Symbol                            | Value      | Unit  |
|---|-----------------------------------|------------|-------|
| Drain-Source Voltage                            | V <sub>DSS</sub>                  | 200        | Vdc   |
| Drain-Gate Voltage (R <sub>GS</sub> = 1 MΩ)     | V <sub>DGR</sub>                  | 200        | Vdc   |
| Gate-Source Voltage — Continuous                | V <sub>GS</sub>                   | ± 20       | Vdc   |
| — Non-repetitive (t <sub>p</sub> ≤ 50 μs)       | V <sub>GSM</sub>                  | ± 40       | Vpk   |
| Drain Current — Continuous                      | I <sub>D</sub>                    | 12         | Adc   |
| — Pulsed  | I <sub>DM</sub>                   | 40         |       |
| Total Power Dissipation @ T <sub>C</sub> = 25°C | P <sub>D</sub>                    | 100        | Watts |
| Derate above 25°C                               |                                   | 0.8        | W/°C  |
| Operating and Storage Temperature Range         | T <sub>J</sub> , T <sub>stg</sub> | -65 to 150 | °C    |

**THERMAL CHARACTERISTICS**

|   |                  |      |      |
|---|------------------|------|------|
| Thermal Resistance  |                  |      | °C/W |
| Junction to Case  | R <sub>θJC</sub> | 1.25 |      |
| Junction to Ambient TO-220  | R <sub>θJA</sub> | 62.5 |      |
| Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds | T <sub>L</sub>   | 260  | °C   |



NOTES:  
 1. DIMENSIONS IN - AND TOLERANCES UNLESS OTHERWISE SPECIFIED ARE IN MILLIMETERS.  
 2. DIMENSIONS IN PARENTHESES ARE FOR REFERENCE ONLY.  
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| DIM | MILLIMETERS |       | INCHES |       |
|-----|-------------|-------|--------|-------|
|     | MIN         | MAX   | MIN    | MAX   |
| A   | 12.70       | 15.75 | 0.500  | 0.625 |
| B   | 9.65        | 10.28 | 0.380  | 0.408 |
| C   | 4.00        | 4.62  | 0.157  | 0.182 |
| D   | 0.64        | 0.68  | 0.025  | 0.027 |
| E   | 3.61        | 3.73  | 0.142  | 0.147 |
| F   | 2.40        | 2.66  | 0.095  | 0.105 |
| G   | 2.80        | 3.00  | 0.110  | 0.118 |
| H   | 0.46        | 0.64  | 0.018  | 0.025 |
| I   | 12.70       | 14.27 | 0.500  | 0.562 |
| J   | 1.15        | 1.52  | 0.045  | 0.060 |
| K   | 4.80        | 5.33  | 0.190  | 0.210 |
| L   | 2.54        | 3.05  | 0.100  | 0.120 |
| M   | 3.00        | 3.75  | 0.118  | 0.148 |
| N   | 1.15        | 1.27  | 0.045  | 0.050 |
| O   | 3.61        | 4.00  | 0.142  | 0.157 |
| P   | 0.90        | 1.10  | 0.035  | 0.043 |
| Q   | 1.10        | 1.27  | 0.043  | 0.050 |
| R   | 1.10        | 1.27  | 0.043  | 0.050 |
| S   | 1.10        | 1.27  | 0.043  | 0.050 |
| T   | 1.10        | 1.27  | 0.043  | 0.050 |
| U   | 0.90        | 1.10  | 0.035  | 0.043 |
| V   | 1.10        | 1.27  | 0.043  | 0.050 |
| W   | 1.10        | 1.27  | 0.043  | 0.050 |
| X   | 1.10        | 1.27  | 0.043  | 0.050 |
| Y   | 1.10        | 1.27  | 0.043  | 0.050 |
| Z   | 1.10        | 1.27  | 0.043  | 0.050 |



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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

**OFF CHARACTERISTICS**

|  |               |     |           |                 |
|--|---------------|-----|-----------|-----------------|
| Drain-Source Breakdown Voltage<br>( $V_{GS} = 0, I_D = 0.25 \text{ mA}$ )  | $V_{(BR)DSS}$ | 200 | —         | Vdc             |
| Zero Gate Voltage Drain Current<br>( $V_{DS} = \text{Rated } V_{DSS}, V_{GS} = 0$ )<br>( $V_{DS} = \text{Rated } V_{DSS}, V_{GS} = 0, T_J = 125^\circ\text{C}$ ) | $I_{DSS}$     | —   | 10<br>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            |

**ON CHARACTERISTICS\***

|   |              |          |          |      |
|---|--------------|----------|----------|------|
| Gate Threshold Voltage<br>( $V_{DS} = V_{GS}, I_D = 1 \text{ mA}$ )<br>$T_J = 100^\circ\text{C}$  | $V_{GS(th)}$ | 2<br>1.5 | 4.5<br>4 | Vdc  |
| Static Drain-Source On-Resistance ( $V_{GS} = 10 \text{ Vdc}, I_D = 6 \text{ Adc}$ )  | $R_{DS(on)}$ | —        | 0.35     | Ohm  |
| Drain-Source On-Voltage ( $V_{GS} = 10 \text{ V}$ )<br>( $I_D = 12 \text{ Adc}$ )<br>( $I_D = 6 \text{ Adc}, T_J = 100^\circ\text{C}$ ) | $V_{DS(on)}$ | —        | 5<br>4.2 | Vdc  |
| Forward Transconductance ( $V_{DS} = 15 \text{ V}, I_D = 6 \text{ A}$ )   | $g_{FS}$     | 4.5      | —        | mhos |

**DYNAMIC CHARACTERISTICS**

|                              |  |           |   |      |    |
|------------------------------|--|-----------|---|------|----|
| Input Capacitance            | ( $V_{DS} = 25 \text{ V}, V_{GS} = 0,$<br>$f = 1 \text{ MHz}$ )<br>See Figure 11 | $C_{iss}$ | — | 1000 | pF |
| Output Capacitance           |  | $C_{oss}$ | — | 400  |    |
| Reverse Transfer Capacitance |  | $C_{rss}$ | — | 100  |    |

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

|                     |  |              |          |     |    |
|---------------------|--|--------------|----------|-----|----|
| Turn-On Delay Time  | ( $V_{DD} = 25 \text{ V}, I_D = 0.5 \text{ Rated } I_D$<br>$R_{gen} = 50 \text{ ohms}$ )<br>See Figures 9, 13 and 14 | $t_{d(on)}$  | —        | 50  | ns |
| Rise Time           |  | $t_r$        | —        | 250 |    |
| Turn-Off Delay Time |  | $t_{d(off)}$ | —        | 100 |    |
| Fall Time           |  | $t_f$        | —        | 120 |    |
| Total Gate Charge   | ( $V_{DS} = 0.8 \text{ Rated } V_{DSS},$<br>$I_D = \text{Rated } I_D, V_{GS} = 10 \text{ V}$ )<br>See Figure 12      | $Q_g$        | 24 (Typ) | 50  | nC |
| Gate-Source Charge  |  | $Q_{gs}$     | 13 (Typ) | —   |    |
| Gate-Drain Charge   |  | $Q_{gd}$     | 11 (Typ) | —   |    |

**SOURCE DRAIN DIODE CHARACTERISTICS\***

|                       |   |          |                             |   |     |
|-----------------------|---|----------|-----------------------------|---|-----|
| Forward On-Voltage    | ( $I_S = \text{Rated } I_D$<br>$V_{GS} = 0$ ) | $V_{SD}$ | 1.5 (Typ)                   | 3 | Vdc |
| Forward Turn-On Time  |   | $t_{on}$ | Limited by stray inductance |   |     |
| Reverse Recovery Time |   | $t_{rr}$ | 300 (Typ)                   | — | ns  |

**INTERNAL PACKAGE INDUCTANCE**

|  |       |                        |   |    |
|--|-------|------------------------|---|----|
| Internal Drain Inductance<br>(Measured from the contact screw on tab to center of die)<br>(Measured from the drain lead 0.25" from package to center of die) | $L_d$ | 3.5 (Typ)<br>4.5 (Typ) | — | nH |
| Internal Source Inductance<br>(Measured from the source lead 0.25" from package to source bond pad.)   | $L_s$ | 7.5 (Typ)              | — |    |

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