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FAIRCHILD SEMICONDUCTOR™

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# MTP3055VL

## N-Channel Logic Level Enhancement Mode Field Effect Transistor

### General Description

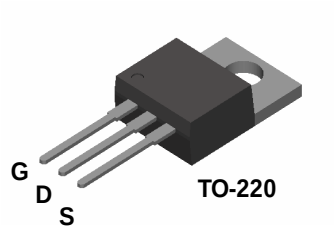
This N-Channel Logic Level MOSFET has been designed specifically for low voltage, high speed switching applications i.e. power supplies and power motor controls.

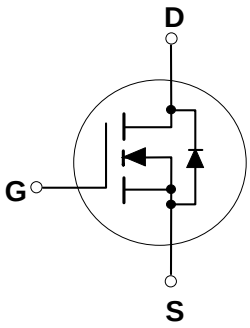
This MOSFET features faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications.

The result is a MOSFET that is easy and safer to drive (even at very high frequencies).

### Features

- 12 A, 60 V. $R_{DS(ON)}$ = 0.18 Ω @ $V_{GS}$ = 5 V
- Critical DC electrical parameters specified at elevated temperature.
- Low drive requirements allowing operation directly from logic drivers. Vgs(th) < 2 V.
- Rugged internal source-drain diode can eliminate the need for an external Zener diode transient suppressor.
- 175°C maximum junction temperature rating.




## Absolute Maximum Ratings $T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 60 | V |
| $V_{GSS}$ | Gate-Source Voltage | ±15 | V |
| $I_D$ | Drain Current - Continuous | 12 | A |
| | - Pulsed | 42 | |
| $P_D$ | Power Dissipation @ $T_C$ = 25°C | 48 | W |
| | Derate above 25°C | 0.32 | W/°C |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -65 to +175 | °C |

## Thermal Characteristics

| | | | |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to- Case | 3.13 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to- Ambient (Note 1) | 62.5 | °C/W |

## Package Outlines and Ordering Information

| Device Marking | Device | Package Information | Quantity |
|---|---|---|---|
| MTP3055VL | MTP3055VL | Rails/Tubes | 45 units |

* Die and manufacturing source subject to change without prior notification.

## Electrical Characteristics

$T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **DRAIN-SOURCE AVALANCHE RATINGS** (Note 2) | | | | | | |
| $w_{DSS}$ | Single Pulse Drain-Source Avalanche Energy | $V_{DD}$ = 25 V, $I_D$ = 12 A | | | 72 | mJ |
| $I_{AR}$ | Maximum Drain-Source Avalanche Current | | | | 12 | A |
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 60 | | | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D$ = 250 µA, Referenced to 25°C | | 55 | | mV/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V | | | 10 | µA |
| | | $V_{DS}$ = 60 V, $V_{GS}$ = 0 V, $T_J$ = 150°C | | | 100 | |
| $I_{GSSF}$ | Gate-Body Leakage Current, Forward | $V_{GS}$ = 15 V, $V_{DS}$ = 0 V | | | 100 | nA |
| $I_{GSSR}$ | Gate-Body Leakage Current, Reverse | $V_{GS}$ = -15 V, $V_{DS}$ = 0 V | | | -100 | nA |
| **On Characteristics** (Note 2) | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 1 | 1.6 | 2 | V |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate Threshold Voltage Temperature Coefficient | $I_D$ = 250 µA, Referenced to 25°C | | -4 | | mV/°C |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = 5 V, $I_D$ = 6 A, | | 0.100 | 0.180 | Ω |
| $V_{DS(on)}$ | Drain-Source On-Voltage On-Resistance | $V_{GS}$ = 5 V, $I_D$ = 12 A | | | 2.6 | V |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 8 V, $I_D$ = 6 A | 5 | 8.7 | | S |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25 V, $V_{GS}$ = 0 V, f = 1.0 MHz | | 345 | 570 | pF |
| $C_{oss}$ | Output Capacitance | | | 110 | 160 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 30 | 40 | pF |
| **Switching Characteristics** (Note 2) | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 30 V, $I_D$ = 12 A, $V_{GS}$ = 5 V, $R_{GEN}$ = 9.1 Ω | | | 20 | ns |
| $t_r$ | Turn-On Rise Time | | | | 190 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | | 30 | ns |
| $t_f$ | Turn-Off Fall Time | | | | 90 | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 48 V, $I_D$ = 12 A, $V_{GS}$ = 5 V | | 7.8 | 10 | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 1.7 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 3.2 | | nC |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain-Source Diode Forward Current (Note 2) | | | | 12 | A |
| $I_{SM}$ | Maximum Pulsed Drain-Source Diode Forward Current (Note 2) | | | | 42 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = 12 A (Note 2) | | | 1.3 | V |
| $t_{rr}$ | Drain-Source Reverse Recovery Time | $I_F$ =12 A, di/dt = 100A/µs | | 55 | | nS |

**Notes:**

**1.** $R_{\theta JA}$ is the sum of the juntion-to-case and case-to-ambient thermal resistance.

**2.** Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%

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| Datasheet Identification | Product Status | Definition |
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