

500 Volts  
11 Amps  
750 mΩ

# P-CHANNEL ENHANCEMENT MODE POWER MOSFET

- High voltage p-channel power mosfet; complements MSAFX24N50A
- Ultrafast body diode
- Rugged polysilicon gate cell structure
- Increased Unclamped Inductive Switching (UIS) capability
- Hermetically sealed, surface mount power package
- Low package inductance
- Very low thermal resistance
- Reverse polarity available upon request

| DESCRIPTION                                                                                                                                                        | SYMBOL                  | MAX.        | UNIT  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------|-------|
| Drain-to-Source Breakdown Voltage (Gate Shorted to Source)<br>@ $T_J \geq 25^\circ\text{C}$                                                                        | $BV_{DSS}$              | 500         | Volts |
| Drain-to-Gate Breakdown Voltage @ $T_J \geq 25^\circ\text{C}$ , $R_{GS} = 1\text{ M}\Omega$                                                                        | $BV_{DGR}$              | 500         | Volts |
| Continuous Gate-to-Source Voltage                                                                                                                                  | $V_{GS}$                | +/-20       | Volts |
| Transient Gate-to-Source Voltage                                                                                                                                   | $V_{GSM}$               | +/-30       | Volts |
| Continuous Drain Current<br><br>100°C                                                                                                                              | $I_{D25}$<br>$I_{D100}$ | 11<br>8     | Amps  |
| Peak Drain Current, pulse width limited by $T_{Jmax}$                                                                                                              | $I_{DM}$                | 44          | Amps  |
| Repetitive Avalanche Current                                                                                                                                       | $I_{AR}$                | 11          | Amps  |
| Repetitive Avalanche Energy                                                                                                                                        | $E_{AR}$                | 30          | mJ    |
| Single Pulse Avalanche Energy                                                                                                                                      | $E_{AS}$                | tbd         | mJ    |
| Voltage Rate of Change of the Recovery Diode<br>@ $I_S \leq I_{DM}$ , $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ\text{C}$ | $dv/dt$                 | 5.0         | V/ns  |
| Power Dissipation                                                                                                                                                  | $P_D$                   | 300         | Watts |
| Junction Temperature Range                                                                                                                                         | $T_J$                   | -55 to +150 | °C    |
| Storage Temperature Range                                                                                                                                          | $T_{stg}$               | -55 to +150 | °C    |
| Continuous Source Current (Body Diode)                                                                                                                             | $I_S$                   | 11          | Amps  |
| Pulse Source Current (Body Diode)                                                                                                                                  | $I_{SM}$                | 44          | Amps  |
| Thermal Resistance, Junction to Case                                                                                                                               | $\theta_{JC}$           | 0.25        | °C/W  |

# MSAFX11P50A

## Electrical Parameters @ 25°C (unless otherwise specified)

| DESCRIPTION                                                                 | SYMBOL                                        | CONDITIONS                                                                                                           | MIN | TYP.                 | MAX                    | UNIT          |
|-----------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----|----------------------|------------------------|---------------|
| Drain-to-Source Breakdown Voltage<br>(Gate Shorted to Source)               | $BV_{DSS}$                                    | $V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$                                                               | 500 |                      |                        | V             |
| Temperature Coefficient of the Drain-to-Source Breakdown Voltage            | $\Delta BV_{DSS}/\Delta T_J$                  |                                                                                                                      |     | 0.054                |                        | %/°C          |
| Gate Threshold Voltage                                                      | $V_{GS(th)}$                                  | $V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$                                                                   | 2.0 |                      | 4.5                    | V             |
| Temperature Coefficient of the Threshold Voltage                            | $\Delta V_{GS(th)}/\Delta T_J$                |                                                                                                                      |     | 0.12                 |                        | %/°C          |
| Gate-to-Source Leakage Current                                              | $I_{GSS}$                                     | $V_{GS} = \pm 20V_{DC}$ , $V_{DS} = 0$ $T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$                         |     |                      | $\pm 100$<br>$\pm 200$ | nA            |
| Drain-to-Source Leakage Current (Zero Gate Voltage Drain Current)           | $I_{DSS}$                                     | $V_{DS} = 0.8 \cdot BV_{DSS}$ $T_J = 25^\circ\text{C}$<br>$V_{GS} = 0\text{ V}$ $T_J = 125^\circ\text{C}$            |     |                      | 200<br>1000            | $\mu\text{A}$ |
| Static Drain-to-Source On-State Resistance (1)                              | $R_{DS(on)}$                                  | $V_{GS} = 10\text{ V}$ , $I_D = 6\text{ A}$ $T_J = 25^\circ\text{C}$<br>$I_D = 6\text{ A}$ $T_J = 125^\circ\text{C}$ |     | 1.4                  | 0.75                   | $\Omega$      |
| Temperature Coefficient of the Drain-to-Source Resistance                   | $\Delta R_{DS(on)}/\Delta T_J$                |                                                                                                                      |     | 0.6                  |                        | %/°C          |
| Forward Transconductance (1)                                                | $g_{fs}$                                      | $V_{DS} \geq 10\text{ V}$ ; $I_D = 11\text{ A}$                                                                      | 5   | 9                    |                        | S             |
| Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance     | $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$           | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                                  |     | 4700<br>430<br>135   |                        | pF            |
| Turn-on Delay Time<br>Rise Time<br>Turn-off Delay Time<br>Fall Time         | $T_{d(on)}$<br>$t_r$<br>$t_{d(off)}$<br>$t_f$ | $V_{GS} = 10\text{ V}$ , $V_{DS} = 250\text{ V}$ ,<br>$I_D = 6\text{ A}$ , $R_G = 2.00\text{ }\Omega$                |     | 33<br>27<br>35<br>35 |                        | ns            |
| Total Gate Charge<br>Gate-to-Source Charge<br>Gate-to-Drain (Miller) Charge | $Q_{g(on)}$<br>$Q_{gs}$<br>$Q_{gd}$           | $V_{GS} = 10\text{ V}$ , $V_{DS} = 250\text{ V}$ , $I_D = 6\text{ A}$                                                |     | 160<br>50<br>95      |                        | nC            |
| Body Diode Forward Voltage (1)                                              | $V_{SD}$                                      | $I_F = I_S$ , $V_{GS} = 0\text{ V}$                                                                                  |     |                      | 3                      | V             |
| Reverse Recovery Time (Body Diode)                                          | $t_{rr}$                                      | $I_F = 10\text{ A}$ , $25^\circ\text{C}$<br>$-di/dt = 100\text{ A}/\mu\text{s}$ , $125^\circ\text{C}$                |     |                      | 500<br>tbd             | ns            |
| Reverse Recovery Charge                                                     | $Q_{rr}$                                      | $I_F = 10\text{ A}$ , $25^\circ\text{C}$<br>$di/dt = 100\text{ A}/\mu\text{s}$ , $125^\circ\text{C}$                 |     |                      | tbd<br>tbd             | $\mu\text{C}$ |

### Notes

- (1) Pulse test,  $t \leq 300\text{ }\mu\text{s}$ , duty cycle  $\delta \leq 2\%$
- (2) Microsemi Corp. does not manufacture the mosfet die; contact company for details.