

MSAFX24N50A

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Features

- 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

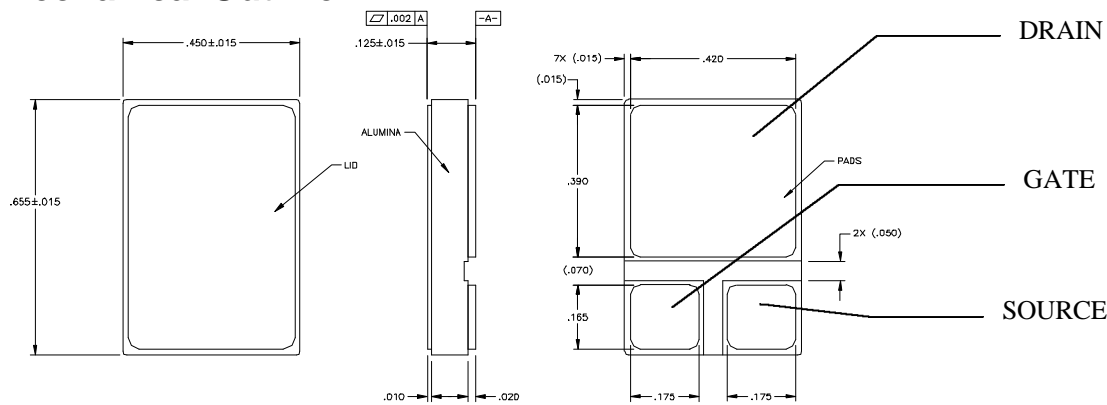
500 Volts
24 Amps
230 mΩ

N-CHANNEL
ENHANCEMENT MODE
POWER MOSFET

Maximum Ratings @ 25°C (unless otherwise specified)

| DESCRIPTION | SYMBOL | MAX. | UNIT |
|--|-------------------------|-------------|-------|
| Drain-to-Source Breakdown Voltage (Gate Shorted to Source) @ $T_J \geq 25^\circ\text{C}$ | 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 100°C | I_{D25} I_{D100} | 24 20 | Amps |
| Peak Drain Current, pulse width limited by T_{Jmax} | I_{DM} | 96 | Amps |
| Repetitive Avalanche Current | I_{AR} | 24 | Amps |
| Repetitive Avalanche Energy | E_{AR} | 30 | mJ |
| Single Pulse Avalanche Energy | E_{AS} | tbd | mJ |
| Voltage Rate of Change of the Recovery Diode @ $I_S \leq I_{DM}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$ | 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 | 24 | Amps |
| Pulse Source Current (Body Diode) | I_{SM} | 96 | Amps |
| Thermal Resistance, Junction to Case | θ_{JC} | 0.25 | °C/W |

Mechanical Outline



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Electrical Parameters @ 25°C (unless otherwise specified)

| DESCRIPTION | SYMBOL | CONDITIONS | MIN | TYP. | MAX | UNIT |
|---|---|---|-----|----------------------|------------------------|---------------|
| Drain-to-Source Breakdown Voltage (Gate Shorted to Source) | BV_{DSS} | $V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$ | 500 | | | V |
| Temperature Coefficient of the Drain-to-Source Breakdown Voltage | $\Delta BV_{DSS}/\Delta T_J$ | | | 5.4 | | V/°C |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 4\ \text{mA}$ | 2.0 | | 4.0 | V |
| Gate-to-Source Leakage Current | I_{GSS} | $V_{GS} = \pm 20V_{DC}, V_{DS} = 0\ \text{T}_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ | | | ± 100 ± 200 | nA |
| Drain-to-Source Leakage Current (Zero Gate Voltage Drain Current) | I_{DSS} | $V_{DS} = 0.8 \cdot BV_{DSS}\ \text{T}_J = 25^\circ\text{C}$ $V_{GS} = 0\ \text{T}_J = 125^\circ\text{C}$ | | | 200 1000 | μA |
| Static Drain-to-Source On-State Resistance (1) | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 12\text{ A}\ \text{T}_J = 25^\circ\text{C}$ $I_D = 24\text{ A}\ \text{T}_J = 25^\circ\text{C}$ $I_D = 12\text{ A}\ \text{T}_J = 125^\circ\text{C}$ | | 0.45 | 0.23 0.27 | Ω |
| Forward Transconductance (1) | g_{fs} | $V_{DS} \geq 10\ \text{V}; I_D = 24\ \text{A}$ | 15 | 21 | | S |
| Input Capacitance Output Capacitance Reverse Transfer Capacitance | C_{iss} C_{oss} C_{rss} | $V_{GS} = 0\ \text{V}, V_{DS} = 25\ \text{V}, f = 1\ \text{MHz}$ | | 4200 450 135 | | pF |
| Turn-on Delay Time Rise Time Turn-off Delay Time Fall Time | $T_{d(on)}$ t_r $t_{d(off)}$ t_f | $V_{GS} = 10\ \text{V}, V_{DS} = 250\ \text{V},$ $I_D = 12\ \text{A}, R_G = 2.00\ \Omega$ | | 16 33 65 30 | 25 45 80 40 | ns |
| Total Gate Charge Gate-to-Source Charge Gate-to-Drain (Miller) Charge | $Q_{g(on)}$ Q_{gs} Q_{gd} | $V_{GS} = 10\ \text{V}, V_{DS} = 250\text{V}, I_D = 12\text{A}$ | | 135 30 65 | 160 40 85 | nC |
| Body Diode Forward Voltage (1) | V_{SD} | $I_F = I_S, V_{GS} = 0\ \text{V}$ | | | 1.5 | V |
| Reverse Recovery Time (Body Diode) | t_{rr} | $I_F = 10\ \text{A},\ 25\ \text{C}$ $-di/dt = 100\ \text{A}/\mu\text{s},\ 125\ \text{C}$ | | | 250 400 | ns |
| Reverse Recovery Charge | Q_{rr} | $I_F = 10\ \text{A},\ 25\ \text{C}$ $di/dt = 100\ \text{A}/\mu\text{s},\ 125\ \text{C}$ | | | 1.0 2.0 | μC |

Notes

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