

**MSAFX40N30A**

**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

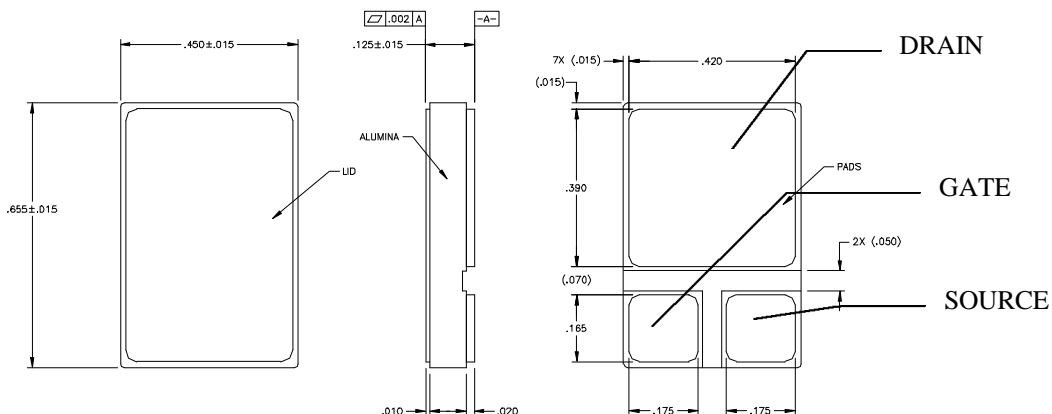
**300 Volts**  
**40 Amps**  
**85 mΩ**

**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) @ $T_J \geq 25^\circ\text{C}$	$BV_{DSS}$	300	Volts
Drain-to-Gate Breakdown Voltage @ $T_J \geq 25^\circ\text{C}$ , $R_{GS} = 1\text{ M}\Omega$	$BV_{DGR}$	300	Volts
Continuous Gate-to-Source Voltage	$V_{GS}$	+/-20	Volts
Transient Gate-to-Source Voltage	$V_{GSM}$	+/-30	Volts
Continuous Drain Current $T_J = 25^\circ\text{C}$ $T_J = 100^\circ\text{C}$	$I_{D25}$ $I_{D100}$	40 30	Amps
Peak Drain Current, pulse width limited by $T_{Jmax}$	$I_{DM}$	160	Amps
Repetitive Avalanche Current	$I_{AR}$	40	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)	$I_S$	40	Amps
Pulse Source Current (Body Diode)	$I_{SM}$	160	Amps
Thermal Resistance, Junction to Case	$\theta_{JC}$	0.25	°C/W

**Mechanical Outline**



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

DESCRIPTION	SYMBOL	CONDITIONS	MIN	TYP.	MAX	UNIT
Drain-to-Source Breakdown Voltage (Gate Shorted to Source)	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	300			V
Temperature Coefficient of the Drain-to-Source Breakdown Voltage	$\Delta BV_{DSS}/\Delta T_J$			tbd		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	$I_{GSS}$	$V_{GS} = \pm 20V_{DC}, V_{DS} = 0\text{ V}, T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			$\pm 100$ $\pm 200$	nA
Drain-to-Source Leakage Current (Zero Gate Voltage Drain Current)	$I_{DSS}$	$V_{DS} = 0.8 \cdot BV_{DSS}, T_J = 25^\circ\text{C}$ $V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$			200 1000	$\mu\text{A}$
Static Drain-to-Source On-State Resistance (1)	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 25^\circ\text{C}$ $I_D = 40\text{ A}, T_J = 25^\circ\text{C}$ $I_D = 20\text{ A}, T_J = 125^\circ\text{C}$		0.085 0.17	0.085	$\Omega$
Forward Transconductance (1)	$g_{fs}$	$V_{DS} \geq 10\text{ V}, I_D = 40\text{ A}$	22	25		S
Input Capacitance Output Capacitance Reverse Transfer Capacitance	$C_{iss}$ $C_{oss}$ $C_{rss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		4800 745 280		pF
Turn-on Delay Time Rise Time Turn-off Delay Time Fall Time	$T_{d(on)}$ $t_r$ $t_{d(off)}$ $t_f$	$V_{GS} = 10\text{ V}, V_{DS} = 150\text{ V},$ $I_D = 20\text{ A}, R_G = 2.00\ \Omega$		20 60 75 45	30 90 100 90	ns
Total Gate Charge Gate-to-Source Charge Gate-to-Drain (Miller) Charge	$Q_{g(on)}$ $Q_{gs}$ $Q_{gd}$	$V_{GS} = 10\text{ V}, V_{DS} = 150\text{ V}, I_D = 20\text{ A}$		180 30 80	200 50 105	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)	$t_{rr}$	$I_F = 10\text{ A}, 25\text{ C}$ $-di/dt = 100\text{ A}/\mu\text{s}, 125\text{ C}$			200 350	ns
Reverse Recovery Charge	$Q_{rr}$	$I_F = 10\text{ A}, 25\text{ C}$ $di/dt = 100\text{ A}/\mu\text{s}, 125\text{ C}$			tbd tbd	$\mu\text{C}$

### 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.