

MSAFX50N20A

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

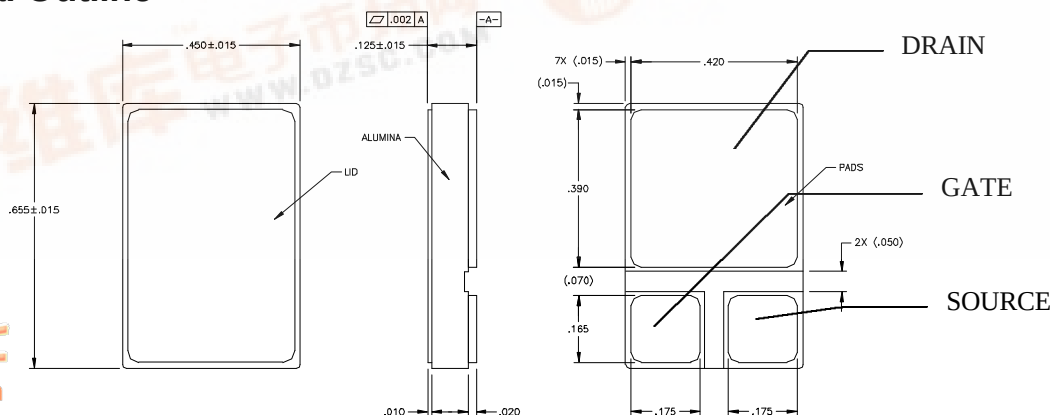
200 Volts
50 Amps
45 mΩ

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}	200	Volts
Drain-to-Gate Breakdown Voltage @ $T_J \geq 25^\circ\text{C}$, $R_{GS} = 1\text{ M}\Omega$	BV_{DGR}	200	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}	50 40	Amps
Peak Drain Current, pulse width limited by T_{Jmax}	I_{DM}	200	Amps
Repetitive Avalanche Current	I_{AR}	50	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	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$
Continuous Source Current (Body Diode)	I_S	50	Amps
Pulse Source Current (Body Diode)	I_{SM}	200	Amps
Thermal Resistance, Junction to Case	θ_{JC}	0.25	$^\circ\text{C}/\text{W}$

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}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	200			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}	$V_{GS} = \pm 20V_{DC}$, $V_{DS} = 0$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$			± 100 ± 200	nA
Drain-to-Source Leakage Current (Zero Gate Voltage Drain Current)	I_{DSS}	$V_{DS} = 0.8 \cdot BV_{DSS}$ $T_J = 25^\circ\text{C}$ $V_{GS} = 0\text{ V}$ $T_J = 125^\circ\text{C}$			200 1000	μA
Static Drain-to-Source On-State Resistance (1)	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 25\text{ A}$ $T_J = 25^\circ\text{C}$ $I_D = 50\text{ A}$ $T_J = 25^\circ\text{C}$ $I_D = 25\text{ A}$ $T_J = 125^\circ\text{C}$		0.09	0.045 0.055	Ω
Forward Transconductance (1)	g_{fs}	$V_{DS} \geq 10\text{ V}$; $I_D = 50\text{ A}$	26	32		S
Input Capacitance Output Capacitance Reverse Transfer Capacitance	C_{iss} C_{oss} C_{rss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		4400 800 285		pF
Turn-on Delay Time Rise Time Turn-off Delay Time Fall Time	$T_{d(on)}$ t_r $t_{d(off)}$ t_f	$V_{GS} = 10\text{ V}$, $V_{DS} = 100\text{ V}$, $I_D = 25\text{ A}$, $R_G = 2.00\text{ }\Omega$		20 15 75 20	25 20 90 25	ns
Total Gate Charge Gate-to-Source Charge Gate-to-Drain (Miller) Charge	$Q_{g(on)}$ Q_{gs} Q_{gd}	$V_{GS} = 10\text{ V}$, $V_{DS} = 100\text{ V}$, $I_D = 25\text{ A}$		190 35 95	220 50 110	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°C $-di/dt = 100\text{ A}/\mu\text{s}$, 125°C			200 300	ns
Reverse Recovery Charge	Q_{rr}	$I_F = 10\text{ A}$, 25°C $di/dt = 100\text{ A}/\mu\text{s}$, 125°C			1.5 2.6	μC

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.