6 Lake Street, Lawrence, MA 01841
1-800-446-1158 / (978) 620-2600 / Fax: (978) 689-0803
Website: http://www.microsemi.com

Gort Road Business Park, Ennis, Co. Clare, Ireland
Tel: +353 (0) 65 6840044 Fax: +353 (0) 65 6822298

TECHNICAL DATA SHEET

N-Channel Enhancement Mode Power Mosfet

DEVICES

MSAFX50N20A

200 Volts
50 Amps
45 mΩ

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

Table 1 – ABSOLUTE MAXIMUM RATINGS (*Tc = +25°C unless otherwise noted)*

Parameters / Test Conditions	Symbol	Max.	Unit
Drain-to-Source Breakdown Voltage (Gate Shorted to Source) @ $T_J \geq 25°C$	BV_{DSS}	200	V
Drain-to-Gate Breakdown Voltage @ $T_J \geq 25°C$, $R_{GS} = 1M\Omega$	BV_{DGR}	200	V
Continuous Gate-to-Source Voltage	V_{GS}	+/-20	V
Transient Gate-to-Source Voltage	V_{GSM}	+/-30	V
Continuous Drain Current $T_J = 25°C$ $T_J = 100°C$	I_{D25} I_{D100}	50 40	A
Peak Drain Current, pulse width limited by T_{Jmax}	I_{DM}	200	A
Repetitive Avalanche Current	I_{AR}	50	A
Repetitive Avalanche Energy	E_{AR}	30	mJ
Single Pulse Avalanche Energy	E_{AS}	TBD	mJ
Voltage Rate of Change of the Recovery Diode @ $I_S \leq I_{DM}$, $di/dt \leq 100A/\mu s$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150°C$	dv/dt	5.0	V/ns
Power Dissipation	P_D	300	W
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	50	A
Pulse Source Current (Body Diode)	I_{SM}	200	A
Thermal Resistance, Junction to Case	θ_{JC}	0.25	°C/W

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Table 2 – ELECTRICAL CHARACTERISTICS (*Tc = +25°C unless otherwise noted)*

Parameters / Test Conditions		Symbol	Min.	Typ	Max.	Unit
Drain-to-Source Breakdown Voltage (Gate Shorted to Source) V_{GS} = 0V, I_D = 250µA		BV_{DSS}	200			V
Temperature Coefficient of the Drain-to-Source - Breakdown Voltage		ΔBV_{DSS} /ΔT_J		TBD		
Gate Threshold Voltage V_{DS} = V_{GS}, I_D = 4 mA		$V_{GS(th)}$	2.0		4.0	
Gate-to-Source Leakage Current V_{GS} = ±20Vdc, V_{DS} = 0	T_J = 25°C T_J = 125°C	I_{GSS}			±100 ±200	nA
Drain-to-Source Leakage Current (Zero Gate Voltage Drain Current) V_{DS} = 0.8 BV_{DSS}, T_J = 25°C V_{GS} = 0V, T_J = 125°C		I_{DSS}			200 1000	µA
Static Drain-to-Source On-State Resistance (1) V_{GS}= 10V, I_D= 25A, T_J = 25°C V_{GS}= 10V, I_D = 50A T_J = 25°C V_{GS}= 10V, I_D = 25A T_J = 125°C		$R_{DS(on)}$		 0.09	0.045 0.055	Ω
Forward Transconductance (1) $V_{DS} \geq$ 10V, I_D = 50A		g_{fs}	26	32		S
Input Capacitance V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		C_{iss}		4400		pF
Output Capacitance $_{VGS}$ = 0V, V_{DS} = 25V, f = 1MHz		C_{oss}		500		pF
Reverse Transfer Capacitance V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		C_{rss}		285		pF
Turn-on Delay Time	V_{GS} = 10V, V_{DS} = 100V, I_D = 25A, R_G = 2.00Ω	$t_{d(on)}$		20	25	nS
Rise Time		t_r		45	50	nS
Turn-off Delay Time		$t_{d(off)}$		75	90	nS
Fall Time		t_f		20	25	nS
Total Gate Charge	V_{GS} = 10V, V_{DS} = 100V, I_D = 25A	$Q_{g(on)}$		190	220	nC
Gate-to-Source Charge		Q_{gs}		35	50	nC
Gate-to-Drain (Miller) Charge		Q_{gd}		95	110	nC
Body Diode Forward Voltage (1) I_F = I_S, V_{GS} = 0V		V_{SD}			1.5	V
Reverse Recovery Time (Body Diode) I_F = 10A, T_J = 25°C -di/dt = 100 A / µs, T_J = 125°C		t_{rr}			200 300	nS
Reverse Recovery Charge I_F = 10A, T_J = 25°C di/dt = 100A / µs, T_J = 125°C		Q_{rr}			1.5 2.6	µC

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PACKAGE DIMENSIONS