



2830 S. Fairview Street
Santa Ana, CA 92704
Phone: (714) 979-8220
Fax: (714) 559-5989

MSAFA1N100D
Fast MOSFET Die for
Implantable Cardio Defibrillator
Applications

DESCRIPTION:

- N-Channel enhancement mode high density MOSFET die
- Passivation: oxynitride, 4um
- Frontside (top) Metallization: Al/1%Cu for aluminum wire bonding, 9 um typical.
- Backside Metallization: Ti – Ni (1 um) – Ag (0.2 um) for soft solder attach

FEATURES:

- Low On-state resistance
- Avalanche and Surge Rated
- High Freq. Switching
- Ultra Low Leakage Current
- UIS rated
- Available with Lot Acceptance Testing Spec MSAFA1N100DL, "-L" Suffix

MAXIMUM RATINGS:

SYMBOL	PARAMETER	VALUE	UNIT
V_{DSS}	Drain - Source Voltage	1000	Volts
V_{GS}	Gate - Source Voltage	± 20	Volts
I_{D1}	Continuous Drain Current @ $T_C = 25^\circ C$	1	Amps
I_{D2}	Continuous Drain Current @ $T_C = 100^\circ C$	.8	Amps
I_{DM1}	Pulsed Drain Current ① @ $T_C = 25^\circ C$	4	Amps
I_{AR}	Avalanche Current	1	Amps
E_{AR}	Repetitive Avalanche Energy	TBD	mJ
E_{AS}	Single Pulse Avalanche Energy	TBD	mJ
T_J, T_{STG}	Operating and Storage: Junction Temperature Range	-55 to 150	$^\circ C$

STATIC ELECTRICAL CHARACTERISTICS:

SYMBOL	CHARACTERISTIC / TEST CONDITIONS	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain - Source Breakdown Voltage ($V_{GS} = 0V, I_D = 0.25mA$)	1000			Volts
$V_{GS(TH)2}$	Gate Threshold Voltage ($V_{GS} = V_{DS}, I_D = 1 mA, T_J = 37^\circ C$)		3.4		Volts
$V_{GS(TH)1}$	Gate Threshold Voltage ($V_{GS} = V_{DS}, I_D = 1 mA, T_J = 25^\circ C$)	2	3.5	4.5	Volts
$R_{DS(ON)1}$	Drain – Source On-State Resistance ($V_{GS} = 10V, I_D = I_{D1}, T_J = 25^\circ C$)		12.5	13.5	ohm
$R_{DS(ON)2}$	Drain – Source On-State Resistance ($V_{GS} = 7V, I_D = 5...150 mA, T_J = 37^\circ C$)		12.5		ohm
$R_{DS(ON)3}$	Drain – Source On-State Resistance ($V_{GS} = 7V, I_D = 5...150 mA, T_J = 25^\circ C$)		11.5		ohm
$R_{DS(ON)4}$	Drain – Source On-State Resistance ($V_{GS} = 7V, I_D = 5...150 mA, T_J = 60^\circ C$)		15		ohm
$R_{DS(ON)5}$	Drain – Source On-State Resistance ($V_{GS} = 7V, I_D = I_{D1}, T_J = 125^\circ C$)		23.5		ohm
I_{DSS1}	Zero Gate Voltage Drain Current ($V_{DS} = 80\%BV_{DSS}, V_{GS} = 0V, T_J = 25^\circ C$)			10	μA
I_{DSS2}	Zero Gate Voltage Drain Current ($V_{DS} = 80\%BV_{DSS}, V_{GS} = 0V, T_J = 37^\circ C$)		1		μA
I_{DSS3}	Zero Gate Voltage Drain Current ($V_{DS} = 80\%BV_{DSS}, V_{GS} = 0V, T_J = 125^\circ C$)			100	μA
I_{GSS1}	Gate-Source Leakage Current ($V_{GS} = \pm 20V, V_{CE} = 0V$)			± 100	nA
I_{GSS2}	Gate-Source Leakage Current ($V_{GS} = \pm 20V, V_{CE} = 0V, T_J = 37^\circ C$)		10		nA
I_{GSS3}	Gate-Source Leakage Current ($V_{GS} = \pm 20V, V_{CE} = 0V, T_J = 125^\circ C$)			500	nA



DYNAMIC CHARACTERISTICS:

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	MIN	TYP	MAX	UNIT
C_{iss}	Input Capacitance	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1\text{ MHz}$		290	350	pF
C_{oss}	Output Capacitance			36	45	pF
C_{rss}	Reverse Transfer Capacitance			15	25	pF
Q_g	Total Gate Charge	$V_{GS} = 10V$ $V_{DS} = 0.5BV_{DSS}$ $I_C = 20\text{ mA}$		20		nC
Q_{gs}	Gate-Source Charge			1		nC
Q_{gd}	Gate-Drain ("Miller") Charge			10		nC
$t_d(\text{on})$	Turn-on Delay Time	Resistive Switching (25°C)		6.3		ns
t_r	Rise Time	$V_{GS} = 10V, V_{DS} = 0.5BV_{DSS}$		5.9		ns
$t_d(\text{off})$	Turn-off Delay Time	$I_D = 20\text{ mA}$		315		ns
t_f	Fall Time	$R_g = 1.6\Omega$		2.6		us
$t_d(\text{on})$	Turn-On Delay Time	Resistive Switching (25°C) $V_{GS} = 10V, V_{DS} = 0.5BV_{DSS}$ $I_D = 100\text{ mA}$ $R_g = 1.6\Omega$		6.3		ns
t_r	Rise Time			5.8		ns
$t_d(\text{off})$	Turn-off Delay Time			76		ns
t_f	Fall Time			470		ns
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_S = 1\text{ A}$			1	V
t_{rr}	Reverse Recovery Time	$I_S = 1\text{ A}, dI_S/dt = 100\text{ A/us}$			130	ns
Q_{rr}	Reverse Recovery Charge	$I_S = 1\text{ A}, dI_S/dt = 100\text{ A/us}$			.7	uC

① Repetitive Rating: Pulse width limited by maximum junction temperature.
 $I_C = I_{C2}, V_{CC} = 50V, R_{CE} = 25\Omega, L = 300\mu H, T_J = 25^\circ C$
 $T_J = 150^\circ C$
 See MIL-STD-750 Method 3471

DIE PROBE PARAMETERS (100% TESTS):

SYMBOL	CHARACTERISTIC / TEST CONDITIONS	MIN	TYP	MAX	UNIT
BV_{DSS}	Drain-Source Breakdown Voltage ($V_{GS} = 0V, I_C = 0.25mA$)	1000			Volts
$V_{GS(TH)}$	Gate Threshold Voltage ($V_{DS} = V_{GS}, I_C = 1000\mu A, T_J = 25^\circ C$)	2		4.5	
$R_{DS(ON)}$	Drain-Source On-Resistance ($V_{GS} = 10V, I_C = 1\text{ A}, T_J = 25^\circ C$)			14	ohm
I_{DSS}	Zero Gate Voltage Drain Current ($V_{DS} = 800\text{ V}, V_{GS} = 0V, T_J = 25^\circ C$)			25	uA
I_{GSS}	Gate-Source Leakage Current ($V_{GS} = \pm 20\text{ V}, V_{DS} = 0V$)			±100	nA

MECHANICAL CHARACTERISTICS

