Santa Ana, CA
Microsemi
Progress Powered by Technology

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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°C	1	Amps
I_{D2}	Continuous Drain Current @ T_C = 100°C	.8	Amps
I_{DM1}	Pulsed Drain Current ① @ T_C = 25°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	°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°C		3.4		Volts
$V_{GS(TH)1}$	Gate Threshold Voltage (V_{GS}= V_{DS}, I_D = 1 mA, T_J = 25°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°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°C)		12.5		ohm
$R_{DS(ON)3}$	Drain – Source On-State Resistance (V_{GS} = 7V, I_D = 5…150 mA, T_J= 25°C)		11.5		ohm
$R_{DS(ON)4}$	Drain – Source On-State Resistance (V_{GS} = 7V, I_D = 5…150 mA, T_J= 60°C)		15		ohm
$R_{DS(ON)5}$	Drain – Source On-State Resistance (V_{GS} = 7V, I_D = I_{D1}, T_J = 125°C)		23.5		ohm
I_{DSS1}	Zero Gate Voltage Drain Current (V_{DS} = 80%BV_{DSS}, V_{GS} = 0V, T_J = 25°C)			10	uA
I_{DSS2}	Zero Gate Voltage Drain Current (V_{DS} = 80%BV_{DSS}, V_{GS} = 0V, T_J = 37°C)		1		uA
I_{DSS3}	Zero Gate Voltage Drain Current (V_{DS} = 80%BV_{DSS}, V_{GS} = 0V, T_J = 125°C)			100	uA
I_{GSS1}	Gate-Source Leakage Current (V_{GS} = ±20V, V_{CE} =0V)			±100	nA
I_{GSS2}	Gate-Source Leakage Current (V_{GS}= ±20V V_{CE} =0V), Tj= 37°C		10		nA
I_{GSS3}	Gate-Source Leakage Current (V_{GS}= ±20V V_{CE} =0V), Tj= 125°C			500	nA

 All Ratings: Device Packaged in TO-3 or Microsemi CoolPack Package, T_C = 25°C unless otherwise specified

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DYNAMIC CHARACTERISTICS:

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

① Repetitive Rating: Pulse width limited by maximum junction temperature.
$I_C = I_{C2}, V_{CC}$ = 50V, R_{CE} = 25Ω, L = 300µH, T_J = 25°C
T_J = 150°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 = 1000µA, T_J = 25°C	2		4.5	
R_{DS} (ON)	Drain-Source On-Resistance (V_{GS} = 10V, I_C = 1 A, T_J = 25°C)			14	ohm
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = 800 V, V_{GS} = 0V, T_J = 25°C)			25	uA
I_{GSS}	Gate-Source Leakage Current (V_{GS} = ±20 V, V_{DS} =0V)			±100	nA

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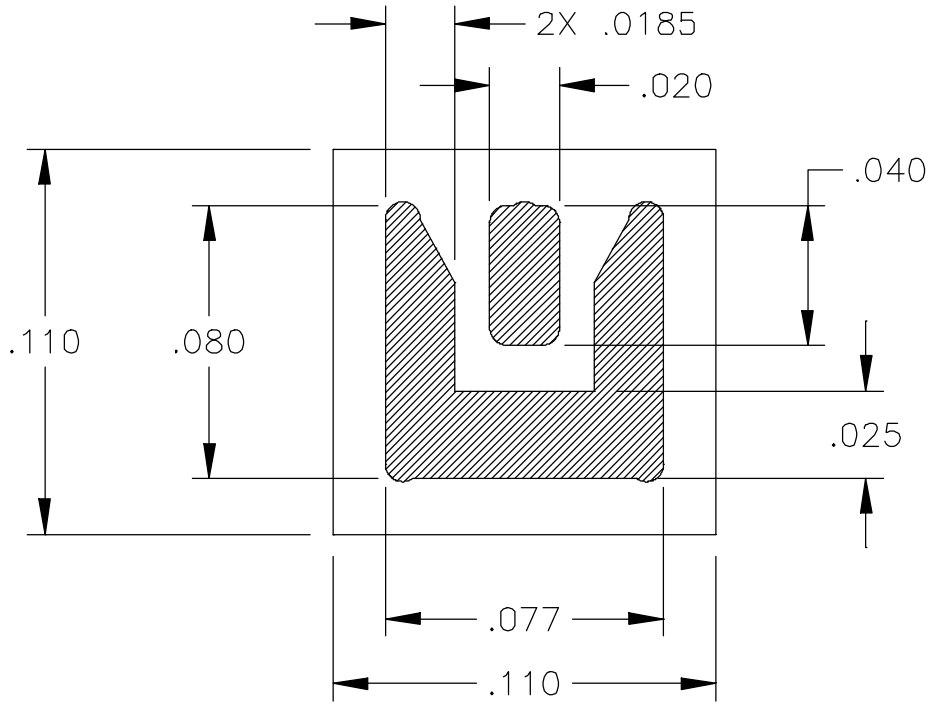
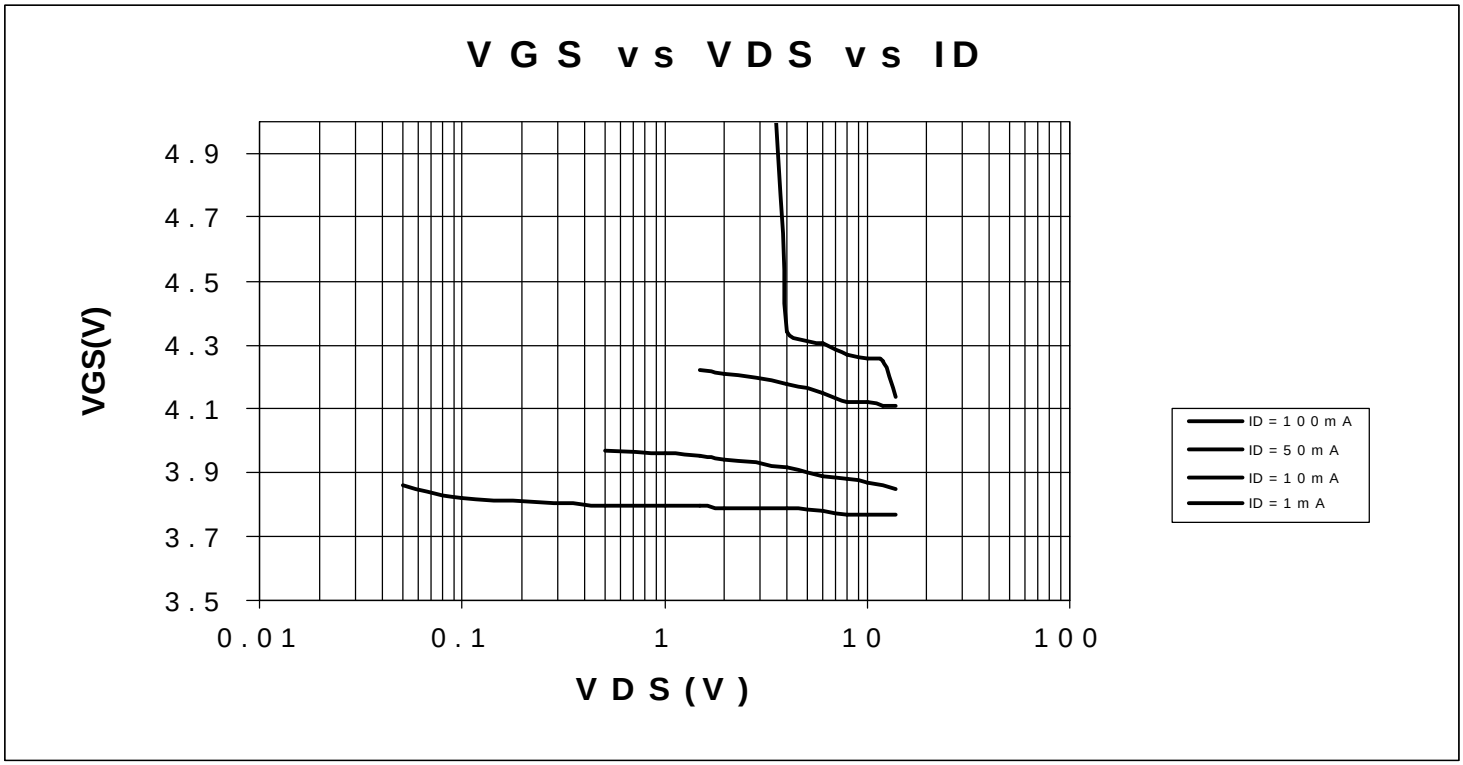
MECHANICAL CHARACTERISTICS





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