

# MS49N20

## N-Channel 30-V (D-S) MOSFET

### Description

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $R_{DS(on)}$  and to ensure minimal power loss and heat dissipation. Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, and PCMCIA cards, cellular and cordless telephones.

### Features

- Low  $r_{DS(on)}$  Provides Higher Efficiency and Extends Battery Life
- Miniature SO-8 Surface Mount Package Saves Board Space
- High power and current handling capability
- Low side high current DC-DC Converter applications
- RoHS compliant package

**Package type :** SO-8

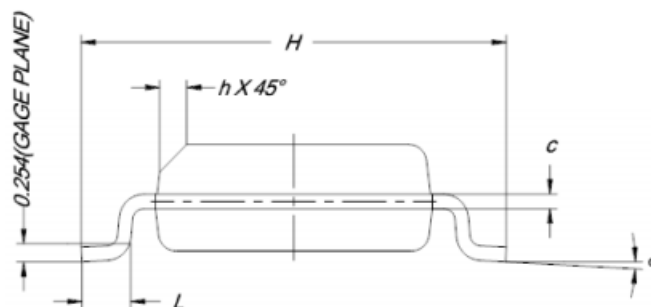
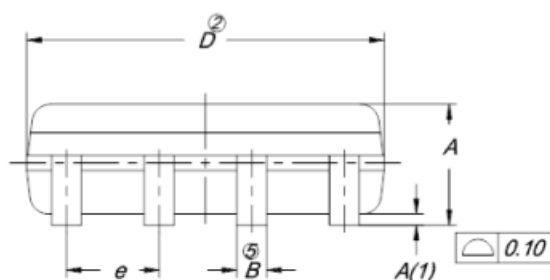
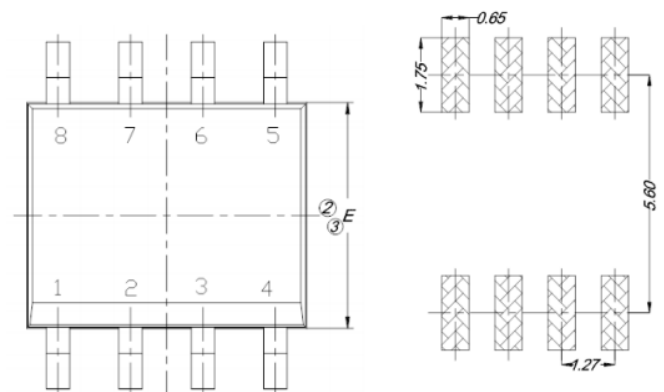
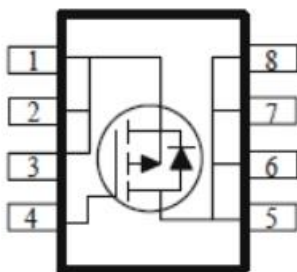
### Packing & Order Information

3,000/Reel



**RoHS  
COMPLIANT**

Graphic symbol



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.35	1.55	1.75
A(1)	0.10	0.18	0.25
B	0.38	0.45	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E	3.80	3.90	4.00
e	1.27 BSC		
H	5.80	6.00	6.20
L	0.50	0.72	0.93
$\alpha$	0°	4°	8°
h	0.25	0.38	0.50

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#### MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

##### Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current <sup>a</sup> ( $T_A=25^\circ\text{C}$ )	$\pm 6.9$	A
	Continuous Drain Current <sup>a</sup> ( $T_A=70^\circ\text{C}$ )	$\pm 5.6$	A
$I_{DM}$	Pulsed Drain Current <sup>b</sup>	$\pm 40$	A
$I_S$	Continuous Source Current (Diode Conduction) <sup>a</sup>	1.7	A
$P_D$	Power Dissipation <sup>a</sup> ( $T_A=25^\circ\text{C}$ )	2.1	W
	Power Dissipation <sup>a</sup> ( $T_A=70^\circ\text{C}$ )	1.3	W
$T_J/T_{STG}$	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$

##### Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient <sup>a</sup> ( $t \leq 10$ sec)	62.5	$^\circ\text{C/W}$
	Maximum Junction-to-Ambient <sup>a</sup> (Steady-State)	110	

Notes :

- Surface Mounted on 1" x 1" FR4 Board.
- Pulse width limited by maximum junction temperature

##### Static

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$V_{GS(th)}$	Gate-Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = -250\mu\text{A}$	1			
$I_{GSS}$	Gate-Body Leakage	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			$\pm 100$	nA
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24$ V, $V_{GS} = 0$ V $V_{DS} = 24$ V, $V_{GS} = 0$ V, $T_J = 55^\circ\text{C}$			1 10	$\mu\text{A}$
$I_{D(on)}$	On-State Drain Current	$V_{DS} = 5$ V, $V_{GS} = 10$ V	20			A
$r_{DS(on)}$	Drain-Source On-Resistance	$V_{GS} = 10$ V, $I_D = 6.9$ A $V_{GS} = 4.5$ V, $I_D = 6.0$ A			34 41	m $\Omega$
$g_{fs}$	Forward Transconductance	$V_{DS} = 15$ V, $I_D = 6.9$ A		20		S
$V_{SD}$	Diode Forward Voltage	$I_S = 1.7$ A, $V_{GS} = 0$ V		0.77		V

##### Dynamic<sup>b</sup>

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$Q_g$	Total Gate Charge	$V_{DS} = 15$ V, $I_D = 6.9$ A, $V_{GS} = 4.5$ V	--	4.0	--	nC
$Q_{gs}$	Gate-Source Charge		--	1.1	--	nC
$Q_{gd}$	Gate-Drain Charge		--	1.4	--	nC

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Dynamic <sup>b</sup>						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{ V}, R_L = 1.9\ \Omega,$ $V_{GEN} = 10\text{ V}, I_D = 1\text{ A}$	--	12	--	ns
$t_r$	Rise Time		--	10	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	60	--	ns
$t_f$	Fall Time		--	15	--	ns
$t_{rr}$	Input Capacitance	$I_F = 1.7\text{ A}, Di/Dt = 100\text{ A/uS}$	--	50	--	ns

NOTE:

Pulse test:  $PW \leq 300\mu s$  duty cycle  $\leq 2\%$ .

Guaranteed by design, not subject to production testing.

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#### Characteristic Curves

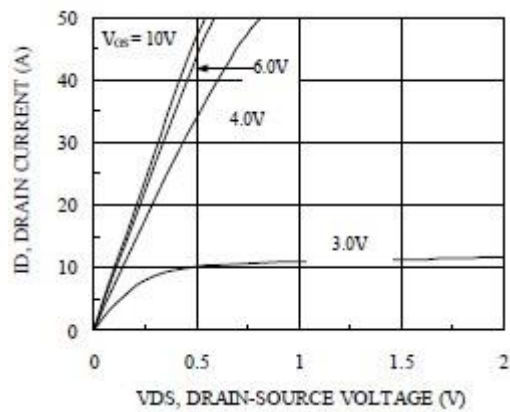


FIG.1-ON REGION CHARACTERISTICS

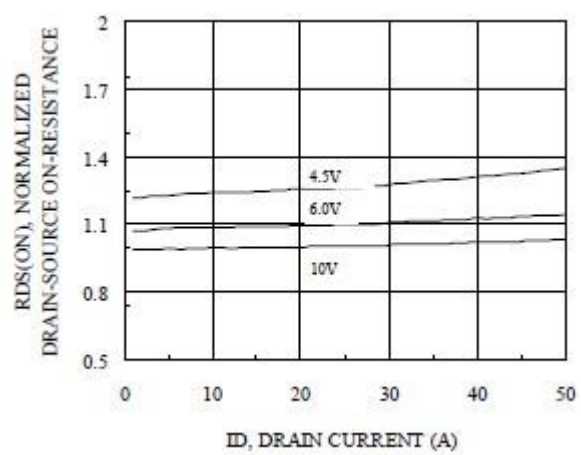


FIG.2- ON-RESISTANCE VARIATION WITH DRAIN CURRENT GATE VOLTAGE

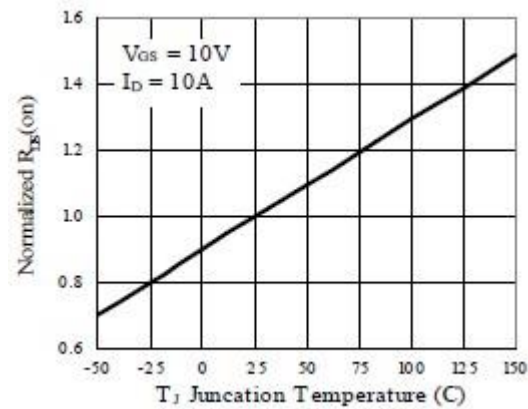


FIG.3-ON RESISTANCE VARIATION WITH TEMPERATURE

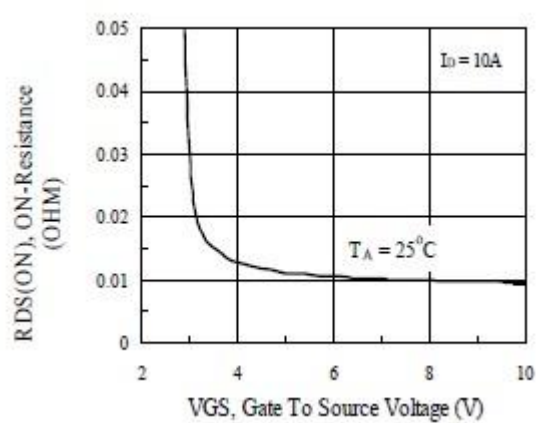


FIG.4-ON-RESISTANCE VARIATION WITH GATE TO SOURCE VOLTAGE

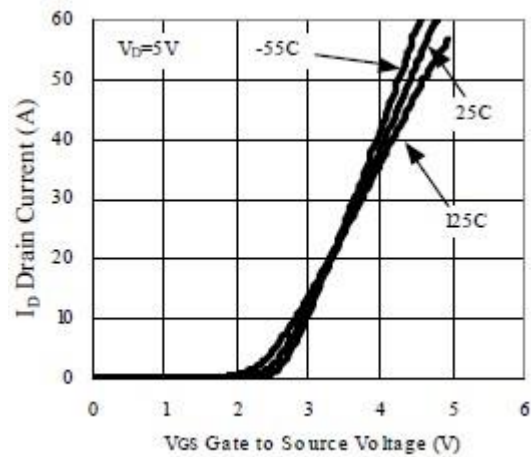


FIG.5-TRANSFER CHARACTERISTICS

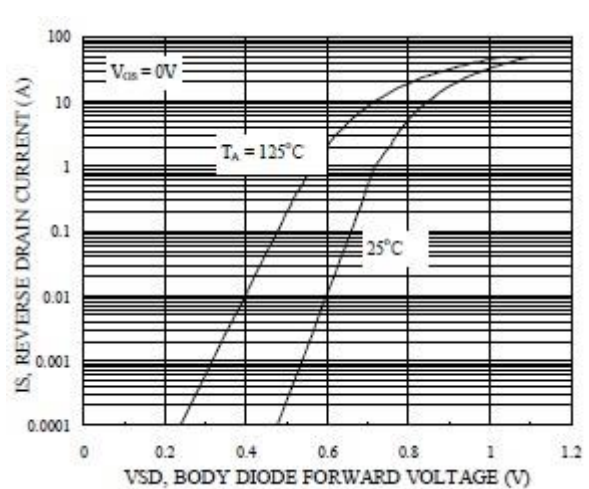


FIG.6-BODY DIODE FORWARD VOLTAGE VARIATION WITH WOURCE CURRENT AND TEMPERATURE

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#### Characteristic Curves

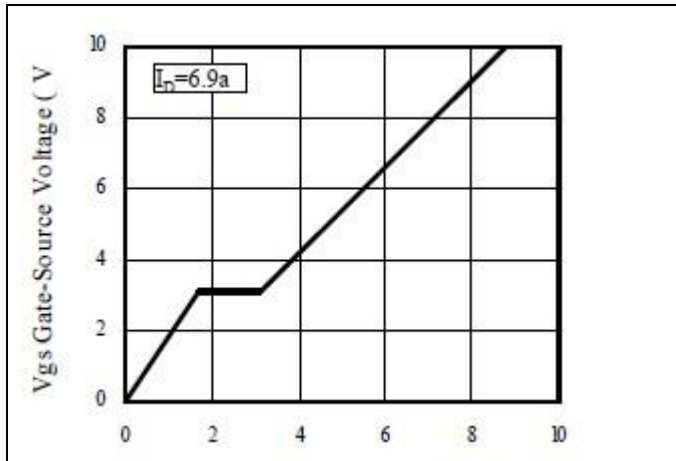


FIG.7-GATE CHARGE CHARACTERISTICS

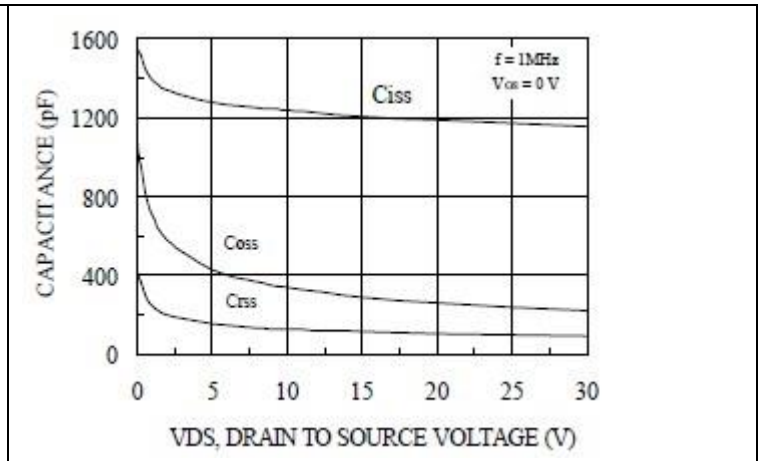


FIG.8-CAPACITANCE CHARACTERISTICS

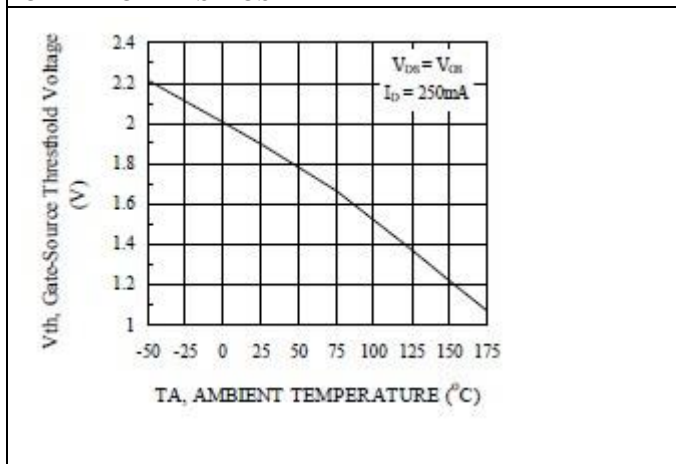


FIG.9-THRESHOLD VS AMBIENT TEMPERATURE

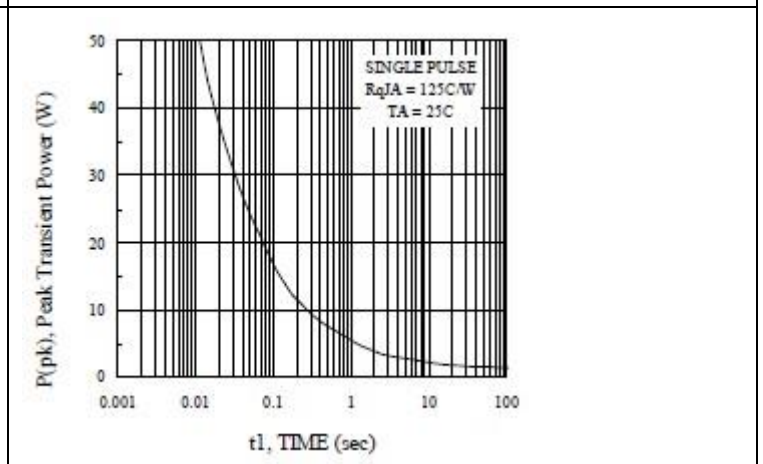


FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

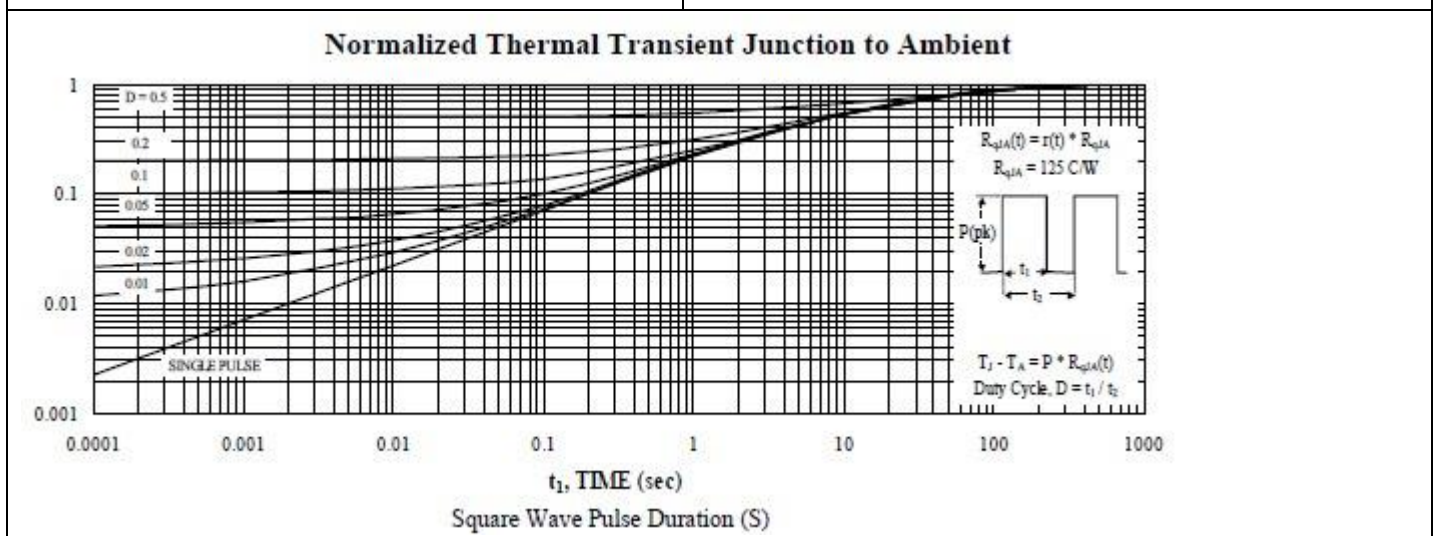


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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#### Disclaimer

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