

MSU5N50

500V N-Channel MOSFET

Description

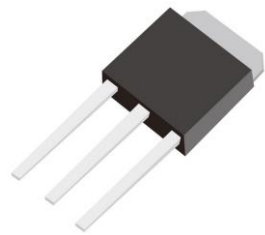
The MSU5N50 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-251 package is universally preferred for all commercial-industrial applications

Features

- Originative New Design
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge : 2.5 nC (Typ.)
- Extended Safe Operating Area
- Lower RDS(ON) : 1.1 Ω (Typ.) @VGS=10V
- 100% Avalanche Tested
- RoHS compliant package

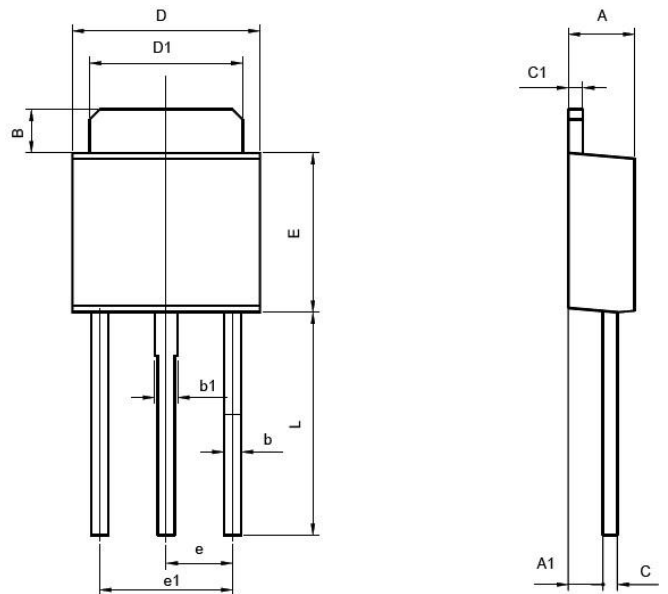
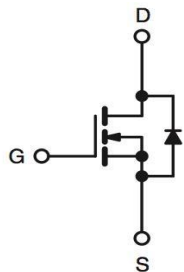
Packing & Order Information

80/Tube ; 4,000/Box



**RoHS
COMPLIANT**

Graphic symbol



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	min	max	min	max
A	2.15	2.45	0.85	0.96
A1	1.00	1.40	0.39	0.55
B	1.25	1.75	0.49	0.69
b	0.45	0.75	0.18	0.3
b1	0.65	0.95	0.26	0.37
C	0.38	0.64	0.15	0.25
C1	0.38	0.64	0.15	0.25
D	6.30	6.70	2.48	2.64
D1	5.10	5.50	2.01	2.17
E	5.30	5.70	2.09	2.24
e	2.3 (typ.)		0.91 (typ.)	
e1	4.4	4.8	1.73	1.89
L	7.4	8.0	2.91	3.15

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MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	500	V
V _{GS}	Gate-Source Voltage	±30	V
I _D	Drain Current -Continuous (TC=25°C)	5	A
	Drain Current -Continuous (TC=100°C)	3	A
I _{DM}	Drain Current Pulsed	20	A
E _{AS}	Single Pulsed Avalanche Energy	305	mJ
E _{AR}	Repetitive Avalanche Energy	7.6	mJ
dV/dt	Peak Diode Recovery dV/dt	4.5	V/ns
P _D	Power Dissipation (TC = 25 °C)	40	W
	- Derate above 25°C	0.32	W/°C
T _J ,T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

- Drain current limited by maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	Max.	Units
R _{θJC}	Junction-to-Case	2.3	°C/W
R _{θJA}	Junction-to-Ambient	110	

On Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
V _{GS}	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	4.0	V
*R _{DS(ON)}	V _{GS} = 10 V , I _D = 2.25 A	--	2.0	1.5	Ω

Off Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
BV _{DSS}	V _{GS} = 0 V , I _D = 250μA	500	--	--	V
ΔBV _{DSS} / ΔT _J	I _D = 250μA, Referenced to 25°C	--	0.6	--	V/°C
I _{DSS}	V _{DS} = 500 V , V _{GS} = 0 V	--	--	1	μA
	V _{DS} = 400 V , V _C = 125°C	--	--	10	
I _{GSSF}	V _{GS} = 30 V , V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	V _{GS} = -30 V , V _{DS} = 0 V	--	--	-100	nA

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Switching Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	$V_{DS} = 250 \text{ V}, I_D = 5 \text{ A},$ $R_G = 25 \Omega$	--	10	--	ns
t_r		--	50	--	ns
$t_{d(off)}$		--	50	--	ns
t_f		--	50	--	ns
Q_g	$V_{DS} = 400 \text{ V}, I_D = 5 \text{ A},$ $V_{GS} = 10 \text{ V}$	--	20	--	nC
Q_{gs}		--	2.5	--	nC
Q_{gd}		--	10	--	nC
C_{ISS}	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V},$ $F = 1.0 \text{ MHz}$	--	520	670	pF
C_{OSS}		--	80	104	pF
C_{RSS}		--	15	20	pF

Source-Drain Diode Maximum Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
I_S			--	--	5	A
I_{SM}			--	--	20	
V_{SD}	$I_S = 5 \text{ A}, V_{GS} = 0 \text{ V}$		--	--	1.4	V
t_{rr}	$I_S = 5 \text{ A}, V_{GS} = 0 \text{ V}$		--	260	--	ns
Q_{rr}			$diF/dt = 100 \text{ A}/\mu\text{s}$	--	2.1	--

Notes ;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L = 22 \text{ mH}, I_{AS} = 5 \text{ A}, V_{DD} = 50 \text{ V}, R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 5 \text{ A}, di/dt \leq 100 \text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

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Characteristics Curve

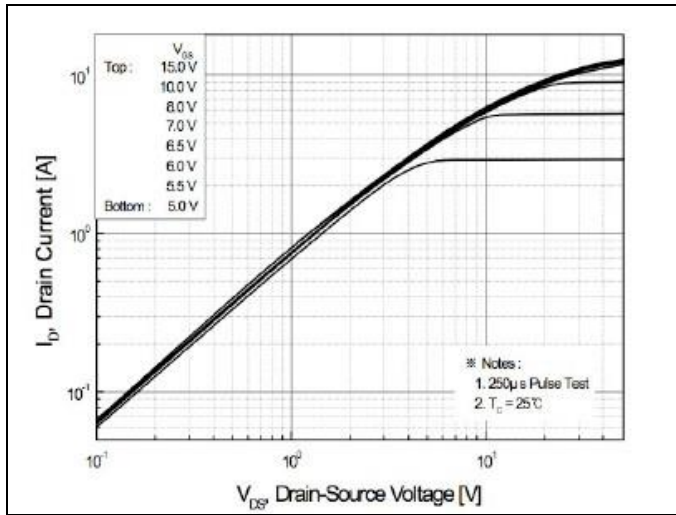


FIG.1-ON REGION CHARACTERISTICS

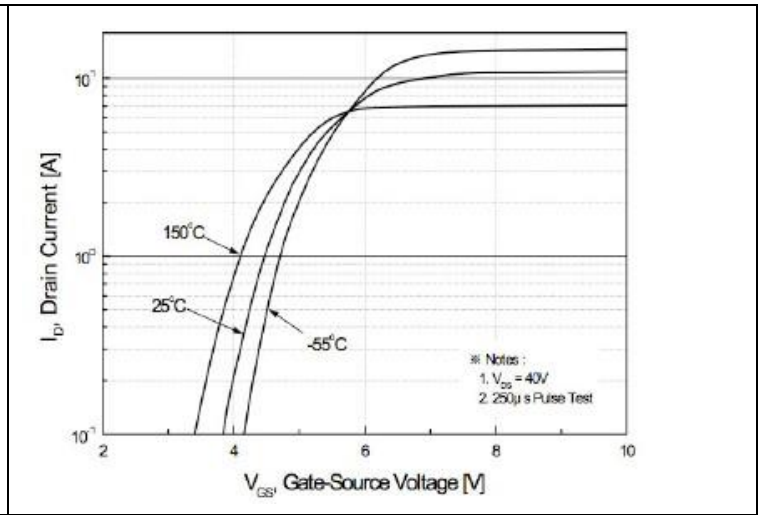


FIG.2-TRANSFER CHARACTERISTICS

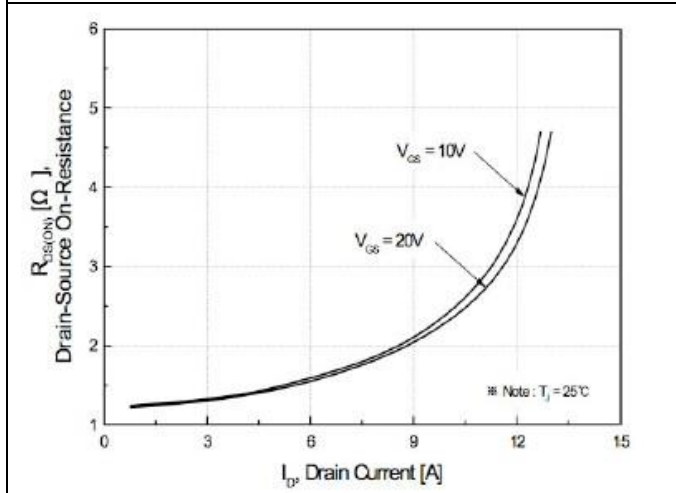


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

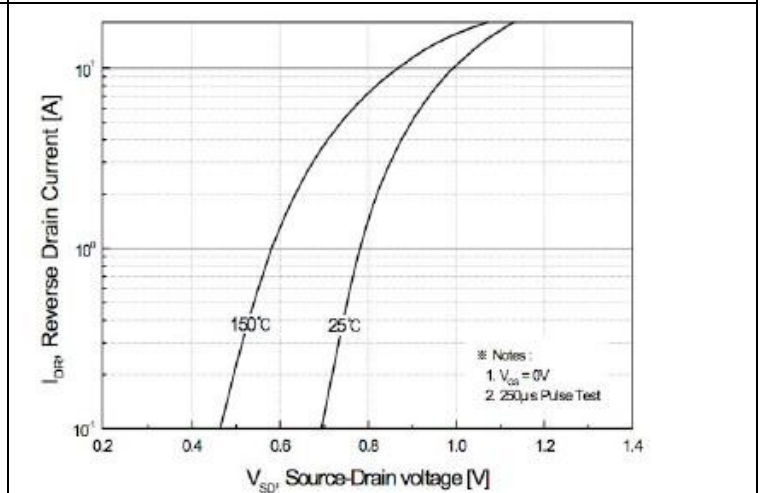


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

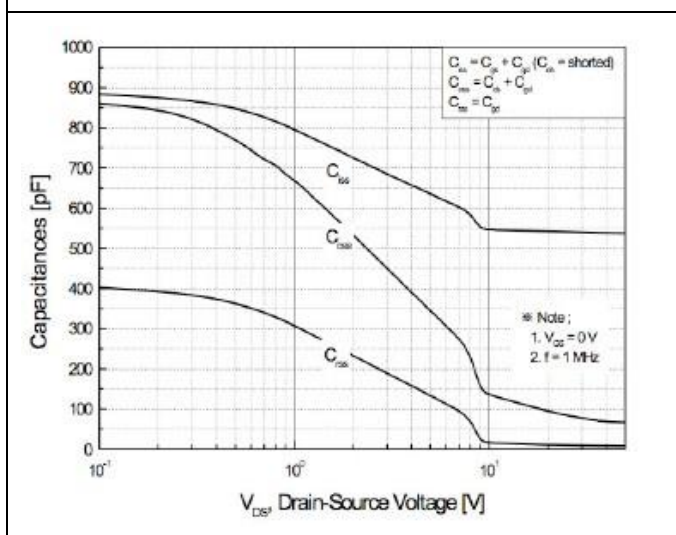


FIG.5-CAPACITANCE CHARACTERISTICS

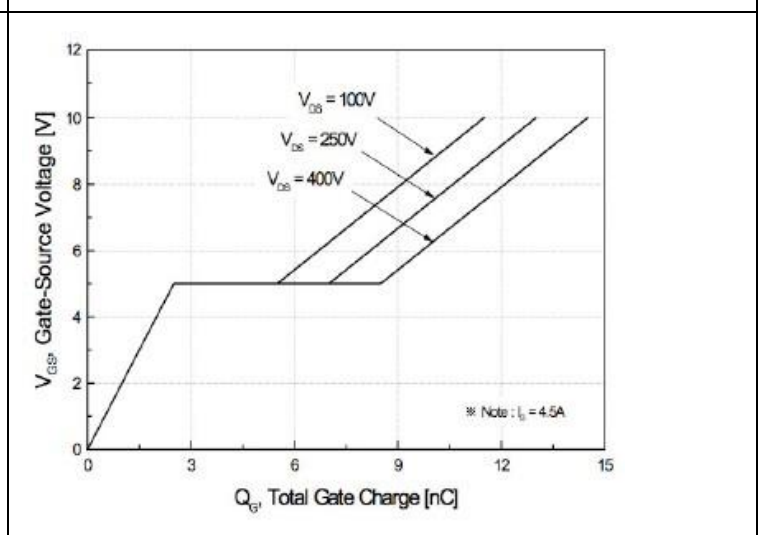


FIG.6-GATE CHARGE CHARACTERISTICS

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Characteristics Curve

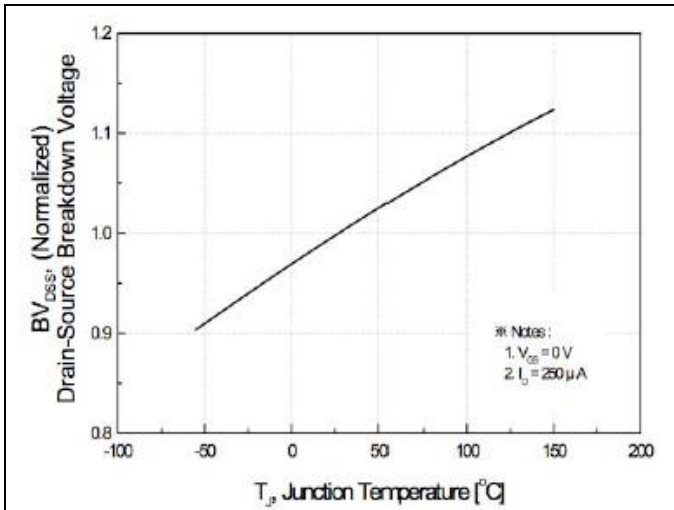


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

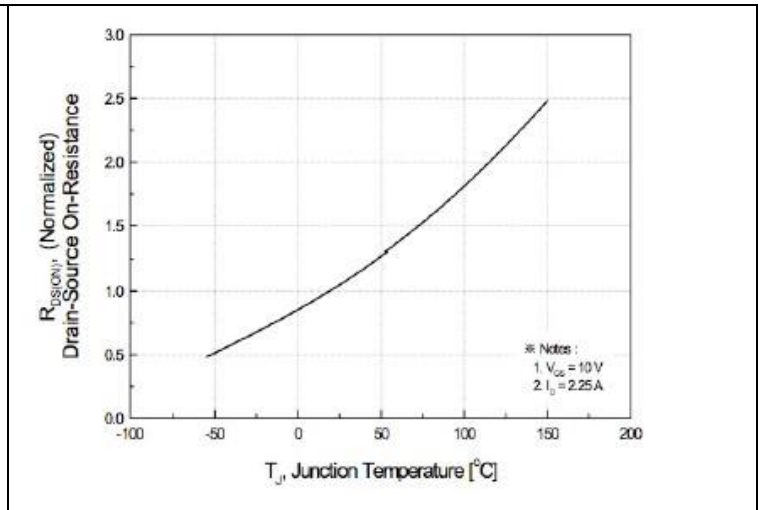


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

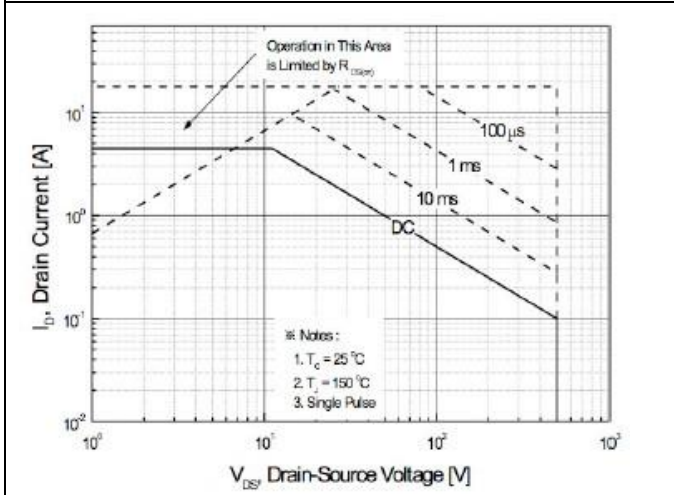


FIG.9-MAXIMUM SAFE OPERATING AREA

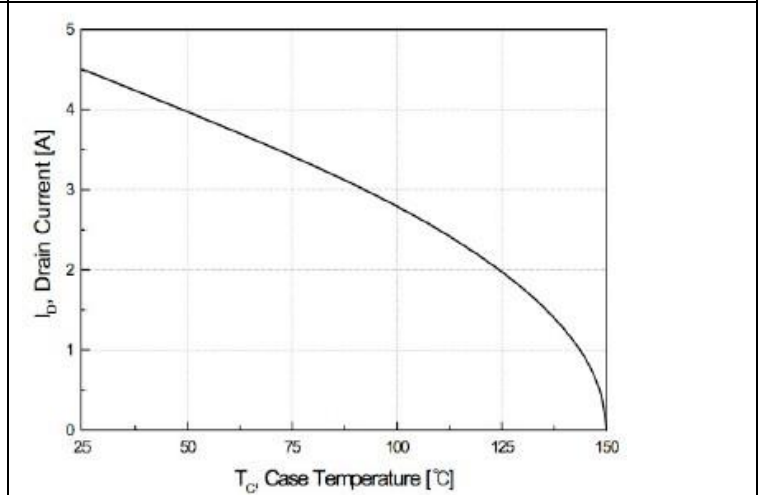


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

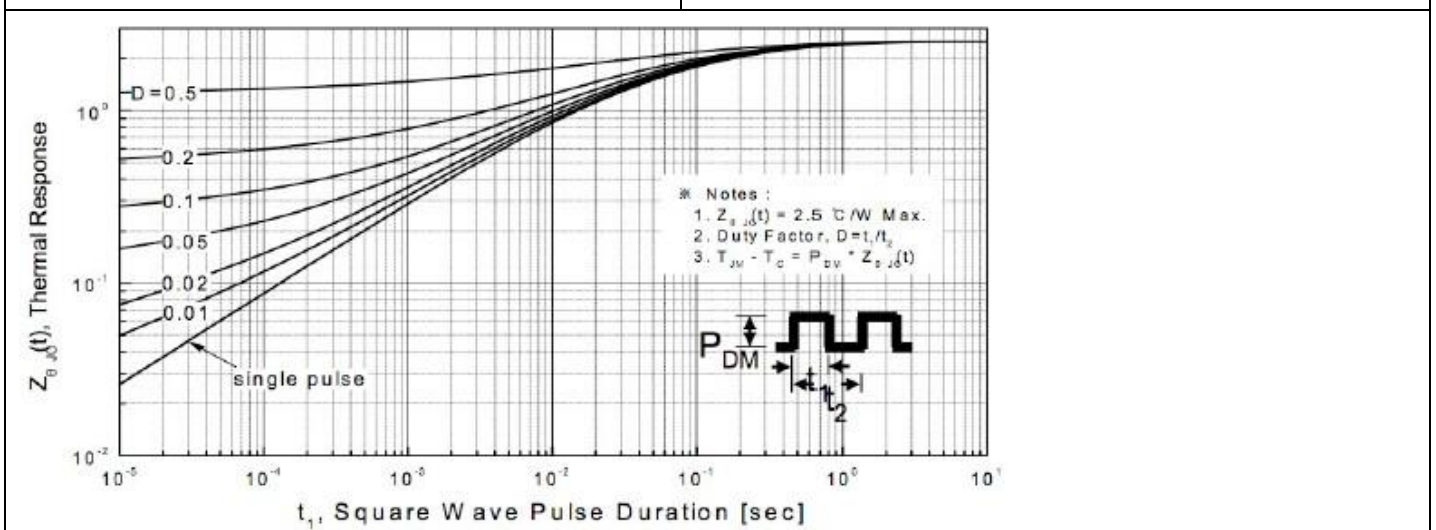


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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