

MS99N45

Dual N Channel 60-V (D-S) MOSFET

Features

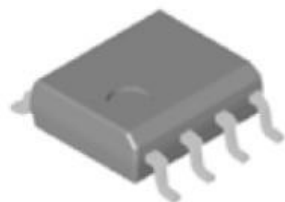
- Low $r_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed
- RoHS compliant package

Typical Applications:

- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

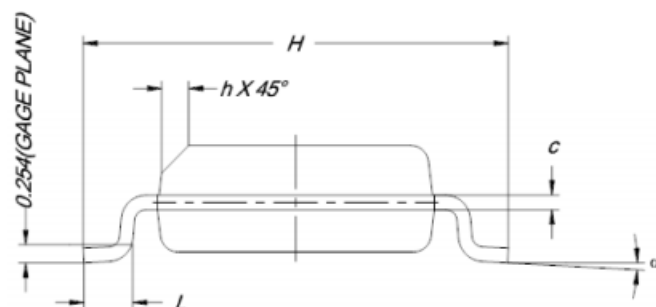
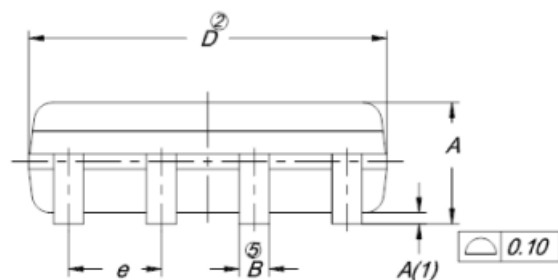
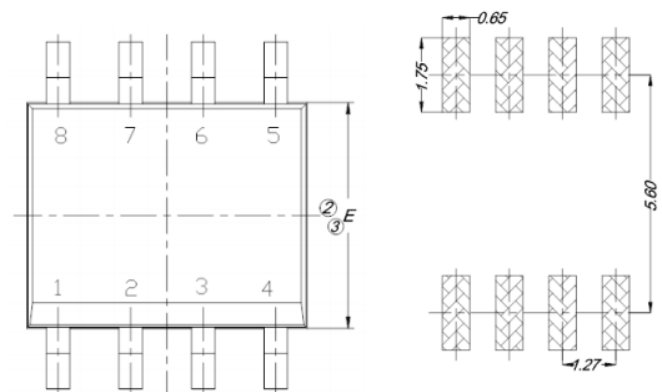
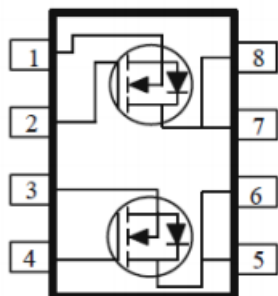
Packing & Order Information

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
α	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	60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ^a ($T_A=25^{\circ}\text{C}$)	3.6	A
	Continuous Drain Current ^a ($T_A=70^{\circ}\text{C}$)	3.1	A
I_{DM}	Pulsed Drain Current ^b	20	A
I_S	Continuous Source Current (Diode Conduction) ^a	1.7	A
P_D	Power Dissipation ^a ($T_A=25^{\circ}\text{C}$)	2.1	W
	Power Dissipation ^a ($T_A=70^{\circ}\text{C}$)	1.3	W
T_J/T_{STG}	Operating Junction and Storage Temperature	1.3	$^{\circ}\text{C}$

Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ^a ($t \leq 10$ sec)	62.5	$^{\circ}\text{C/W}$
	Maximum Junction-to-Ambient ^a (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-Source Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	1			V
I_{GSS}	Gate-Body Leakage	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			± 100	nA
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48$ V, $V_{GS} = 0$ V $V_{DS} = 48$ V, $V_{GS} = 0$ V, $T_J = 55^{\circ}\text{C}$			1 25	μA
$I_{D(on)}$	On-State Drain Current	$V_{DS} = 5$ V, $V_{GS} = 10$ V	8			A
$r_{DS(on)}$	Drain-Source On-Resistance	$V_{GS} = 10$ V, $I_D = 2.9$ A $V_{GS} = 4.5$ V, $I_D = 2.7$ A			89 104	m Ω
g_{fs}	Forward Transconductance	$V_{GS} = 15$ V, $I_D = 2.9$ A		10		S
V_{SD}	Diode Forward Voltage	$I_S = 0.9$ A, $V_{GS} = 0$ V		0.78		V

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Dynamic						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
Q_g	Total Gate Charge	$V_{DS} = 30\text{ V}$, $I_D = 2.9\text{ A}$, $V_{GS} = 4.5\text{ V}$	--	40	--	nC
Q_{gs}	Gate-Source Charge		--	1.2	--	nC
Q_{gd}	Gate-Drain Charge		--	2.1	--	nC
$t_{d(on)}$	Turn-On Delay Time	$I_D = 2.9\text{ A}$, $R_L = 10.4\ \Omega$, $V_{GEN} = 10\text{ V}$, $R_{GEN} = 6\ \Omega$ $V_{DS} = 30\text{ V}$	--	3	--	ns
t_r	Rise Time		--	6	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	17	--	ns
t_f	Fall Time		--	5	--	ns
C_{ISS}	Input Capacitance	$V_{DS} = 15\text{ V}$ $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	--	297	--	pF
C_{OSS}	Output Capacitance		--	40	--	pF
C_{RSS}	Reverse Transfer Capacitance		--	28	--	pF

Notes

- Pulse test: $PW \leq 300\mu s$ duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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■ Typical Electrical Characteristics

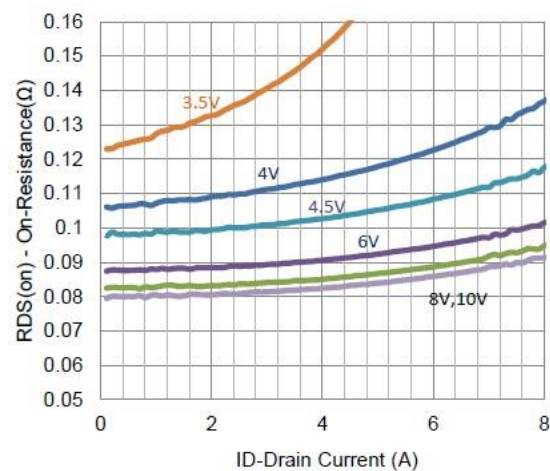


FIG.1-ON-RESISTANCE VS. DRAIN CURRENT

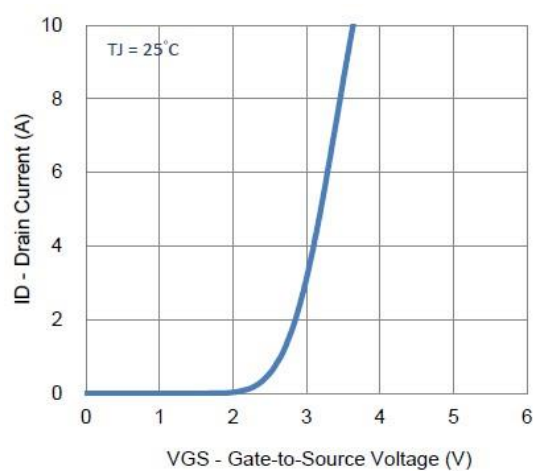


FIG.2-TRANSFER CHARACTERISTICS

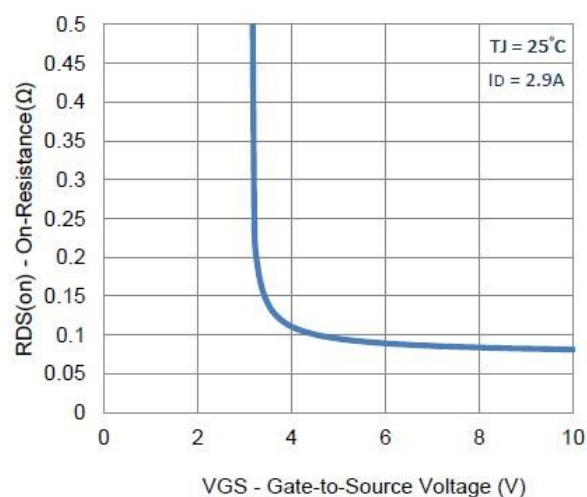


FIG.3-ON-RESISTANCE VS GATE-TO-SOURCE VOLTAGE

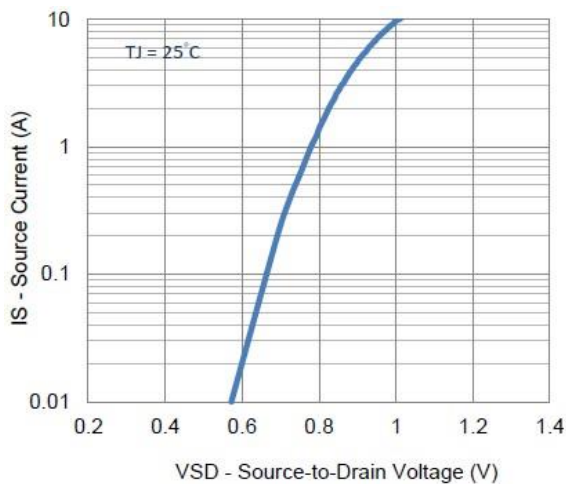


FIG.4-DRAIN-TO-SOURCE FORWARD VOLTAGE

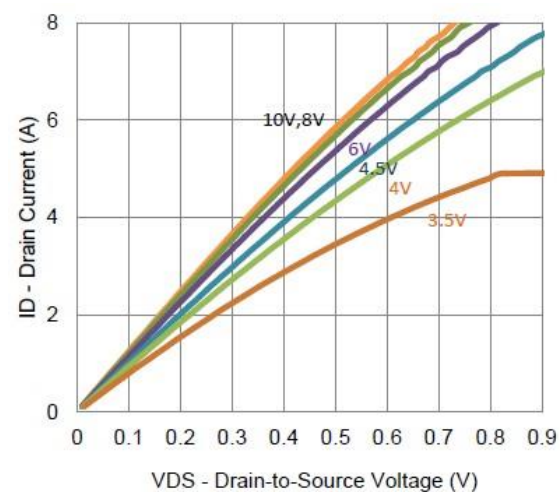


FIG.5-OUTPUT CHARACTERISTICS

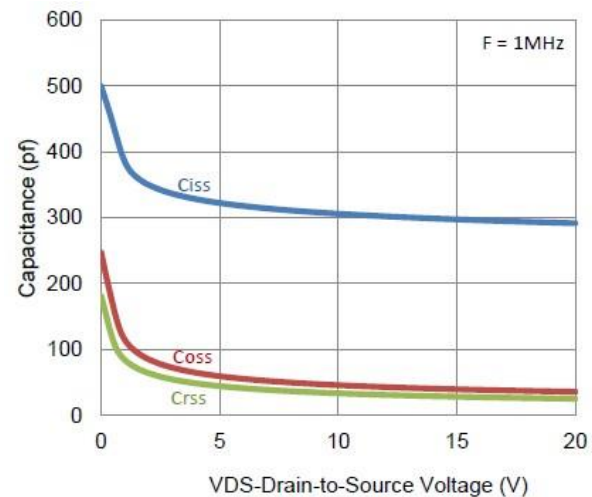


FIG.6-CAPACITANCE

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■ Typical Electrical Characteristics

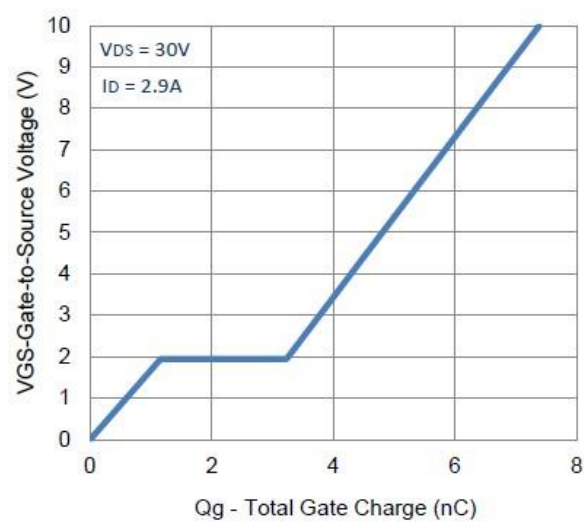


FIG.7-GATE CHARGE

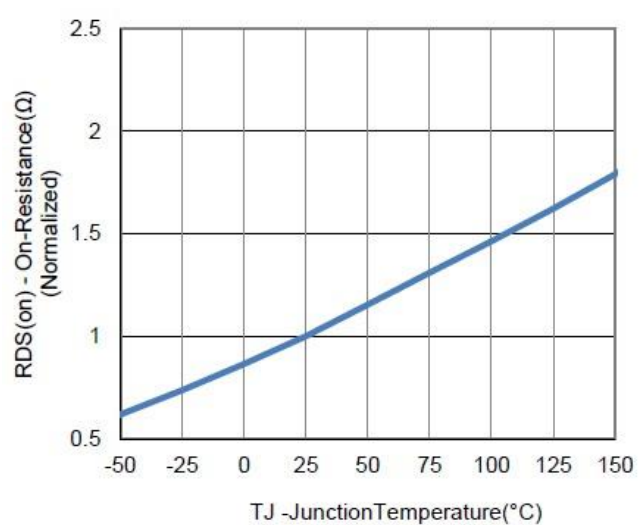


FIG.8-NORMALIZED ON-RESISTANCE VS JUNCTION TEMPERATURE

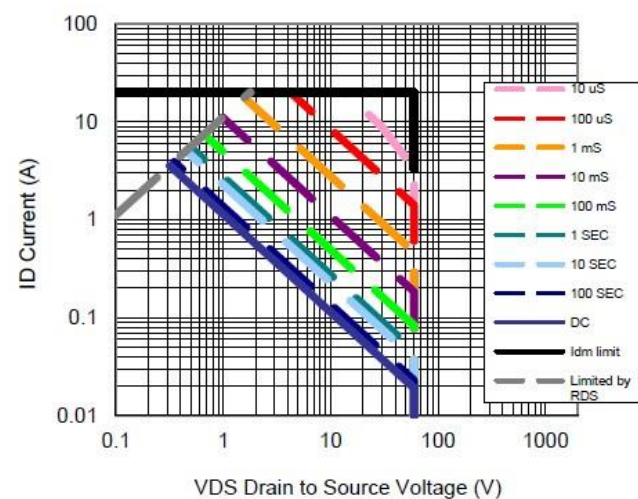


FIG.9-SAFE OPERATING AREA

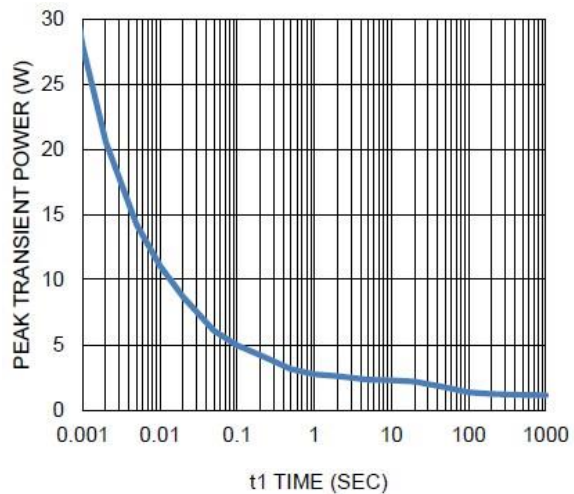


FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

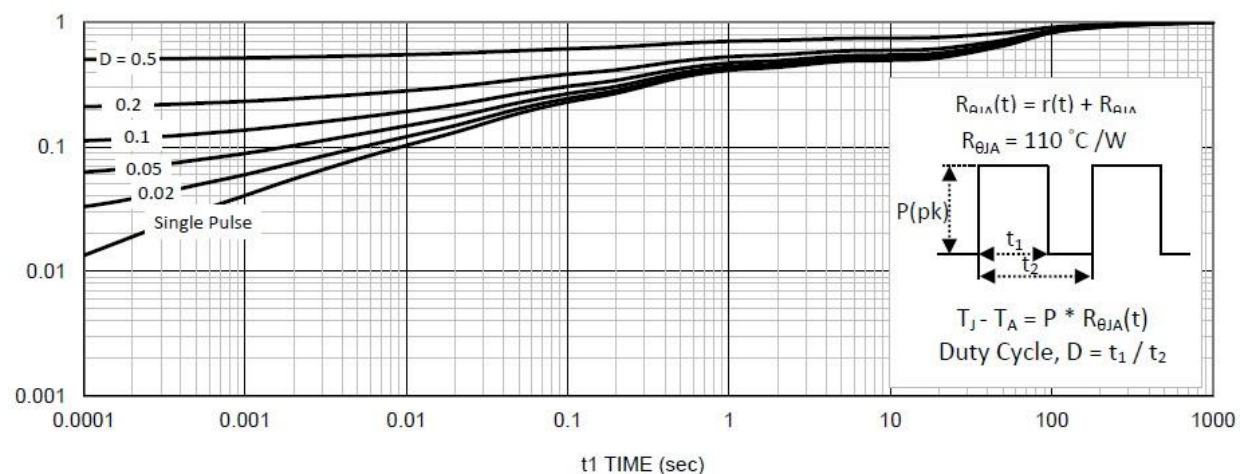


FIG.11-NORMALIZED THERMAL TRANSIENT JUNCTION TO AMBIENT

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