

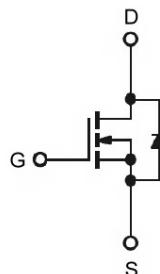
## MSP100N045SA

### N-Channel 100-V (D-S) MOSFET

#### Description

The device is using trench DMOS technology. This advanced technology has been especially tailored to minimize  $R_{DS(ON)}$ , provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

#### Graphic Symbol



#### Features

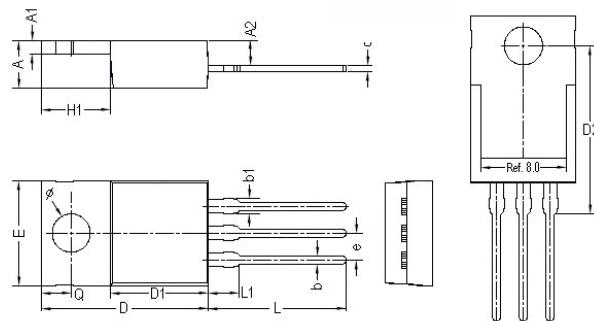
- $R_{DS(ON)} = 4.5\text{m}\Omega$  @  $V_{GS} = 10\text{V}$
- Fast switching
- Improve dv/dt Capability
- 100% EAS Guaranteed
- Green Device Available

#### Typical Applications

- Motor Driver
- Load Switch
- Synchronous Rectifier
- BMS Applications

Package type : TO-220

#### Package Dimension



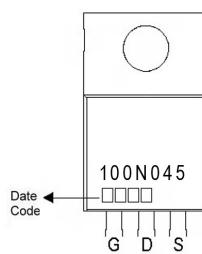
#### Packing & Order Information

2,000/Box

REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.30	4.70	D2	15.70	17.00
A1	1.20	1.40	E	9.70	10.36
A2	2.30	2.79	e	2.54	BSC
b	0.70	0.90	H1	6.10	6.70
b1	1.20	1.75	L	12.80	13.90
c	0.34	0.60	L1	-	4.00
D	14.70	16.10	Q	2.60	3.00
D1	8.60	9.30	Ø	3.55	3.95



#### Marking



RoHS Compliant

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## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings			
Symbol	Parameter	Value	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current <sup>1</sup> ( $T_C = 25^\circ\text{C}$ )	120	A
	Continuous Drain Current <sup>1</sup> ( $T_C = 100^\circ\text{C}$ )	100	A
$I_{DM}$	Pulsed Drain Current <sup>1,2</sup>	480	A
$I_{AS}$	Single Pulse Avalanche Current, $L = 0.5\text{mH}^3$	53	A
$E_{AS}$	Single Pulse Avalanche Energy, $L = 0.5\text{mH}^3$	702	mJ
$P_D$	Power Dissipation <sup>4</sup> ( $T_C = 25^\circ\text{C}$ )	250	W
	Power Dissipation <sup>4</sup> ( $T_A = 25^\circ\text{C}$ )	2	W
$T_J/T_{STG}$	Operating Junction and Storage Temperature	-50 to +150	$^\circ\text{C}$

Thermal Resistance Ratings			
Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient <sup>1</sup>	62.5	$^\circ\text{C/W}$
$R_{\theta JC}$	Maximum Junction-to-Case <sup>1</sup>	0.5	$^\circ\text{C/W}$

Electrical Characteristics ( $T_J=25^\circ\text{C}$ unless otherwise specified)						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	2	3	4	V
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$ , $I_D=250\mu\text{A}$	100	-	-	V
$g_{fs}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=30\text{A}$	-	50	-	S
$I_{GSS}$	Gate-Source Leakage Current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 20\text{V}$	-	-	$\pm 100$	nA
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=100\text{V}$ , $V_{GS}=0\text{V}$ , $T_J=25^\circ\text{C}$ $V_{DS}=100\text{V}$ , $V_{GS}=0\text{V}$ , $T_J=125^\circ\text{C}$	-	-	1 10	$\mu\text{A}$
$R_{DS(\text{on})}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10\text{V}$ , $I_D=30\text{A}$	-	3.7	4.5	$\text{m}\Omega$
$EAS$	Single Pulse Avalanche Energy <sup>5</sup>	$V_{DD}=25\text{V}$ , $L=0.5\text{mH}$ , $I_{AS}=20\text{A}$	100	-	-	mJ
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$I_S=50\text{A}$ , $V_{GS}=0\text{V}$ , $T_J=25^\circ\text{C}$	-	-	1.3	V
$I_S$	Continuous Source Current <sup>1,6</sup>	$V_G=V_D=0\text{V}$ , Force Current	-	-	120	A
$I_{SM}$	Pulsed Source Current <sup>2,6</sup>		-	-	240	

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Dynamic						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Qg	Total Gate Charge <sup>2</sup>	V <sub>DS</sub> = 50V I <sub>D</sub> = 20A V <sub>GS</sub> = 10V	--	72	--	nC
Qgs	Gate-Source Charge		--	28	--	
Qgd	Gate-Drain Charge		--	15	--	
t <sub>d(on)</sub>	Turn-On Delay Time <sup>2</sup>	V <sub>DD</sub> = 50V I <sub>D</sub> = 20A V <sub>GS</sub> = 10V R <sub>G</sub> = 3.0Ω	--	35	--	ns
t <sub>r</sub>	Rise Time		--	18	--	
t <sub>d(off)</sub>	Turn-Off Delay Time		--	45	--	
t <sub>f</sub>	Fall Time		--	55	--	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 50V V <sub>GS</sub> = 0V f = 1.0MHz	--	4725	--	pF
C <sub>oss</sub>	Output Capacitance		--	609	--	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	14	--	
R <sub>g</sub>	Gate Resistance	V <sub>GS</sub> = V <sub>DS</sub> = 0V, f = 1.0MHz	--	1	--	Ω
trr	Reverse Recovery Time	I <sub>F</sub> = 30A, dI/dt = 100A/μs, T <sub>j</sub> = 25°C		70		nS
Qrr	Reverse Recovery Charge			170		nC

## Notes

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%.
3. The EAS data shows maximum rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.3mH, I<sub>AS</sub>=15A.
4. The power dissipation is limited by 150°C junction temperature.
5. The Min. value is 100% EAS tested guarantee.
6. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

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- Typical Electrical Characteristics

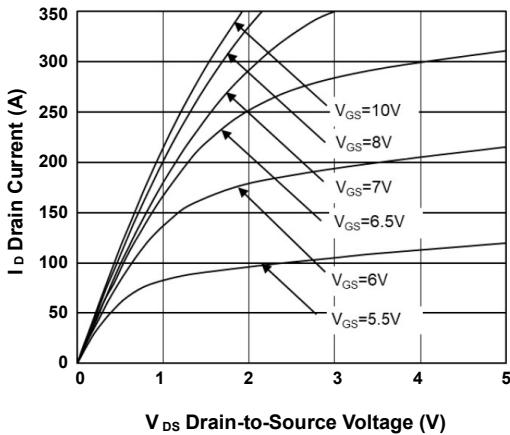


FIG.1-Typical Output Characteristics

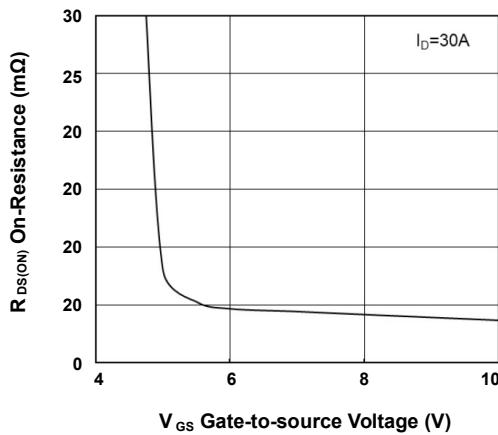


FIG.2-On-Resistance vs. G-S Voltage

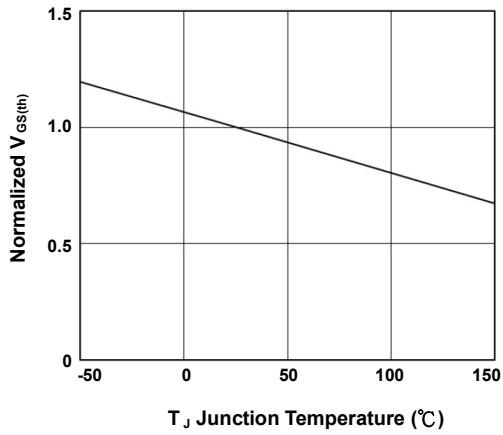


FIG.3-Normalized  $V_{GS(th)}$  vs.  $T_J$

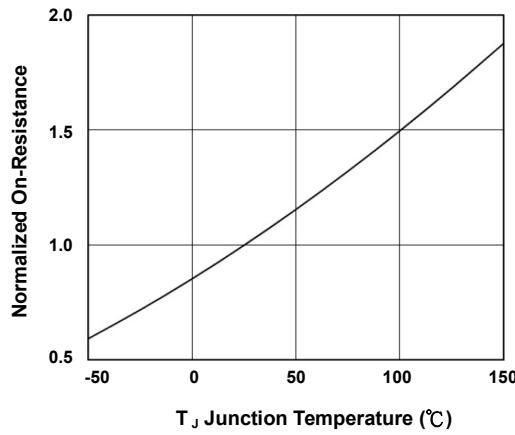


FIG.4-Normalized  $R_{DS(on)}$  vs.  $T_J$

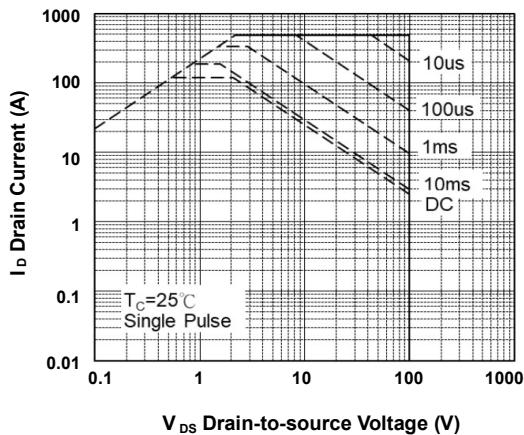


FIG.5-Safe Operating Area

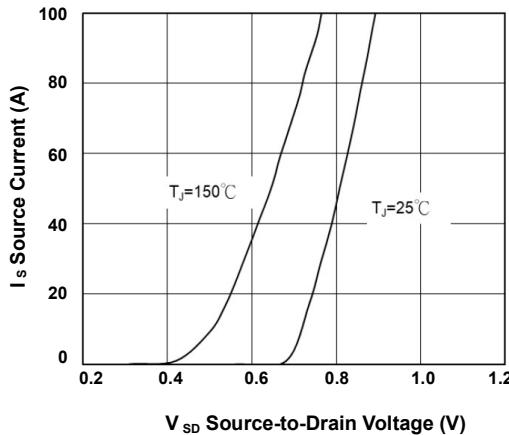


FIG.6-Source Drain Forward Characteristics

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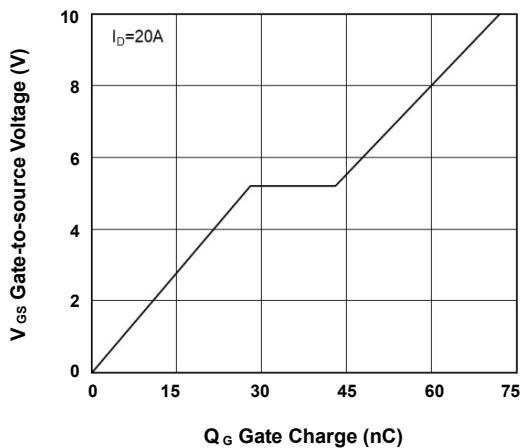


FIG.7-Gate Charge Characteristics

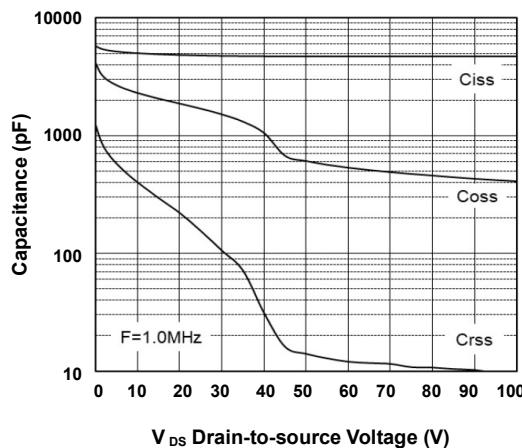


FIG.8-Capacitance Characteristics

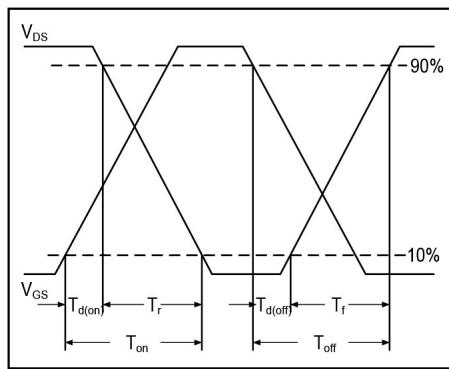


FIG.9-Switching Time Waveform

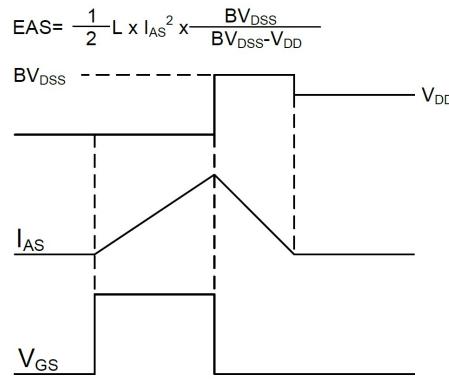


FIG.10-Unclamped Inductive Switching Waveform

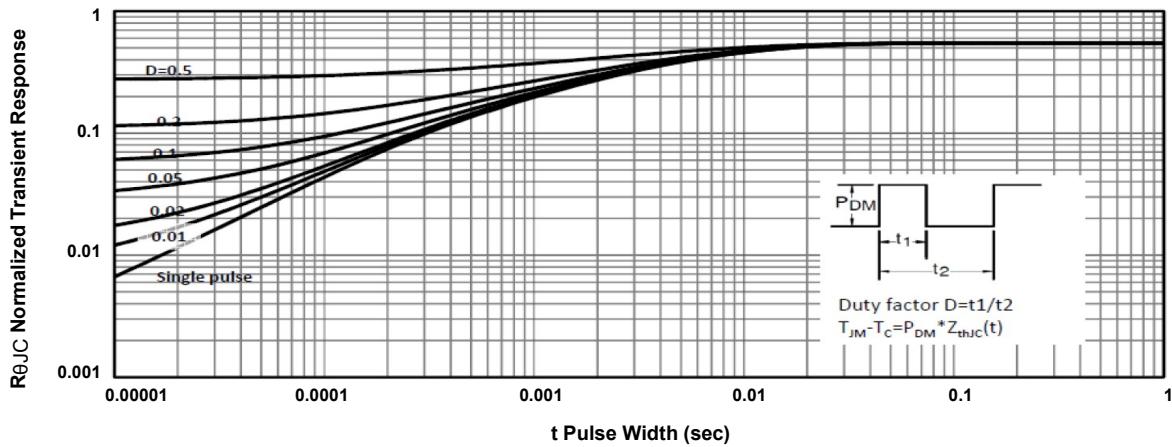


FIG.11-Normalized Maximum Transient Thermal Impedance

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