

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.

Features

- $R_{DS(ON)} = 4.5m\Omega @ V_{GS} = 10V$
- 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

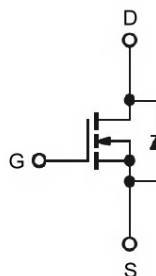
Packing & Order Information

2,000/Box

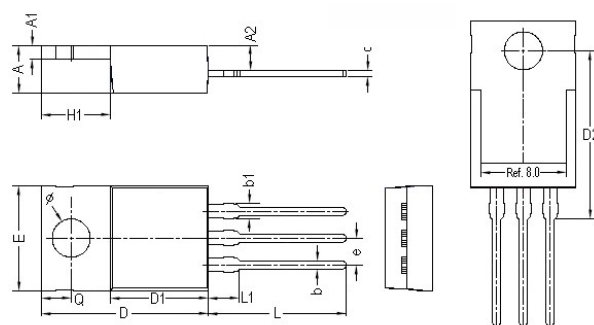


RoHS Compliant

Graphic Symbol

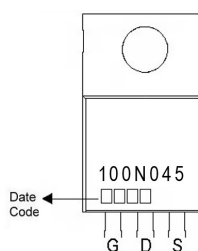


Package Dimension



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



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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	± 20	V
I_D	Continuous Drain Current ¹ ($T_C = 25^\circ\text{C}$)	120	A
	Continuous Drain Current ¹ ($T_C = 100^\circ\text{C}$)	100	A
I_{DM}	Pulsed Drain Current ^{1,2}	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 ⁴ ($T_C = 25^\circ\text{C}$)	250	W
	Power Dissipation ⁴ ($T_A = 25^\circ\text{C}$)	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 ¹	62.5	$^\circ\text{C/W}$
$R_{\theta JC}$	Maximum Junction-to-Case ¹	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
$V_{GS(th)}$	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	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$	-	-	1	μA
		$V_{DS} = 100\text{V}$, $V_{GS} = 0\text{V}$, $T_J = 125^\circ\text{C}$	-	-	10	
$R_{DS(on)}$	Static Drain-Source On-Resistance ²	$V_{GS} = 10\text{V}$, $I_D = 30\text{A}$	-	3.7	4.5	$\text{m}\Omega$
E_{AS}	Single Pulse Avalanche Energy ⁵	$V_{DD} = 25\text{V}$, $L = 0.5\text{mH}$, $I_{AS} = 20\text{A}$	100	-	-	mJ
V_{SD}	Diode Forward Voltage ²	$I_S = 50\text{A}$, $V_{GS} = 0\text{V}$, $T_J = 25^\circ\text{C}$	-	-	1.3	V
I_S	Continuous Source Current ^{1,6}	$V_G = V_D = 0\text{V}$, Force Current	-	-	120	A
I_{SM}	Pulsed Source Current ^{2,6}		-	-	240	

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Dynamic						
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Q_g	Total Gate Charge ²	$V_{DS} = 50V$	--	72	--	nC
Q_{gs}	Gate-Source Charge	$I_D = 20A$	--	28	--	
Q_{gd}	Gate-Drain Charge	$V_{GS} = 10V$	--	15	--	
$t_{d(on)}$	Turn-On Delay Time ²	$V_{DD} = 50V$	--	35	--	ns
t_r	Rise Time	$I_D = 20A$	--	18	--	
$t_{d(off)}$	Turn-Off Delay Time	$V_{GS} = 10V$	--	45	--	
t_f	Fall Time	$R_G = 3.0\Omega$	--	55	--	
C_{iss}	Input Capacitance	$V_{DS} = 50V$	--	4725	--	pF
C_{oss}	Output Capacitance	$V_{GS} = 0V$	--	609	--	
C_{rss}	Reverse Transfer Capacitance	$f = 1.0MHz$	--	14	--	
R_g	Gate Resistance	$V_{GS} = V_{DS} = 0V, f = 1.0MHz$	--	1	--	Ω
t_{rr}	Reverse Recovery Time	$I_F = 30A, dI/dt = 100A/\mu s, T_j = 25^\circ C$		70		nS
Q_{rr}	Reverse Recovery Charge			170		nC

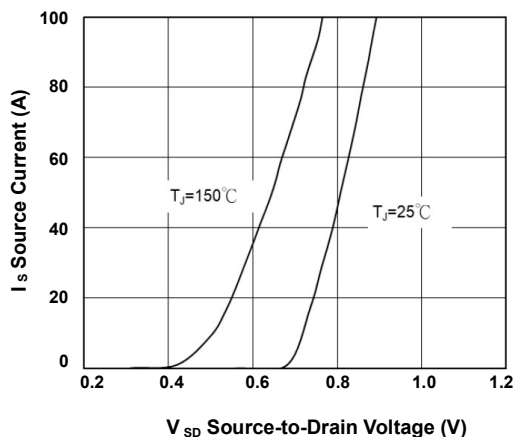
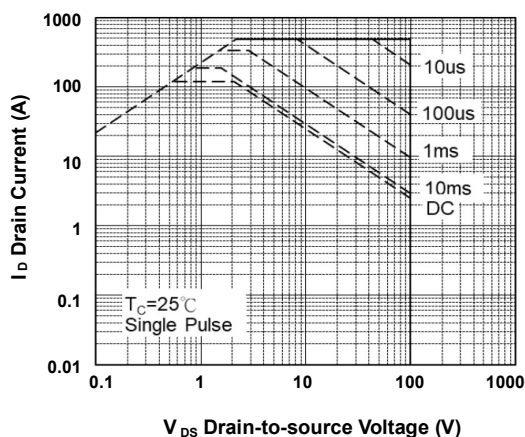
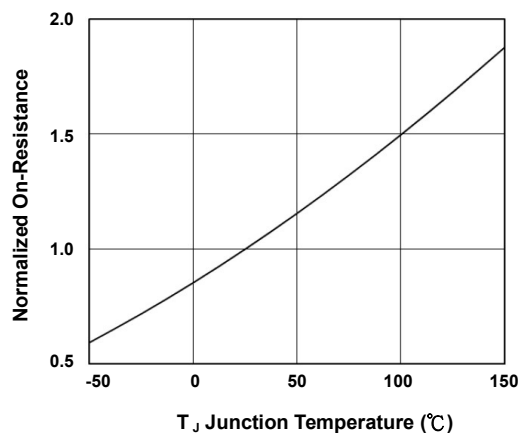
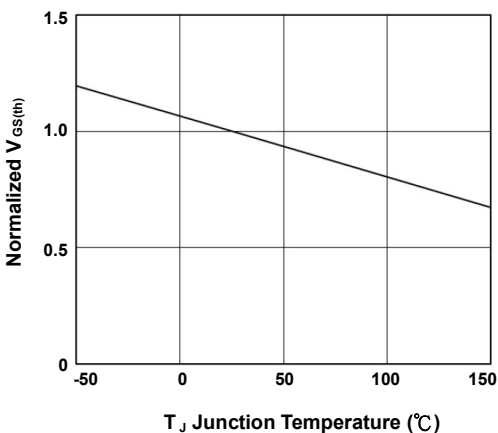
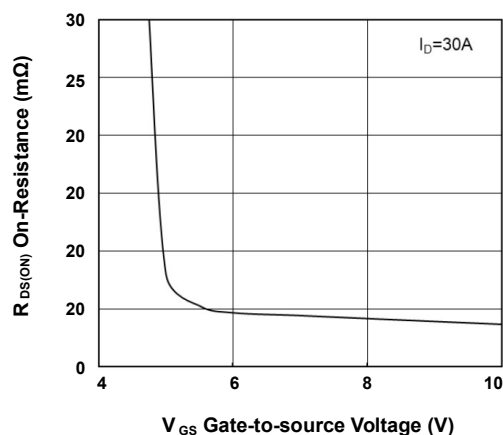
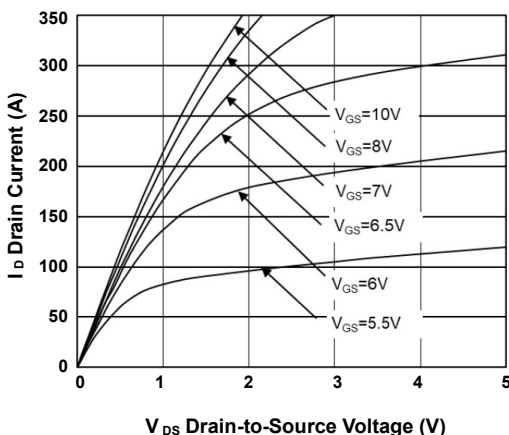
Notes

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. The EAS data shows maximum rating. The test condition is $V_{DD} = 25V, V_{GS} = 10V, L = 0.3mH, I_{AS} = 15A$.
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_D and I_{DM} , in real applications, should be limited by total power dissipation.

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- Typical Electrical Characteristics



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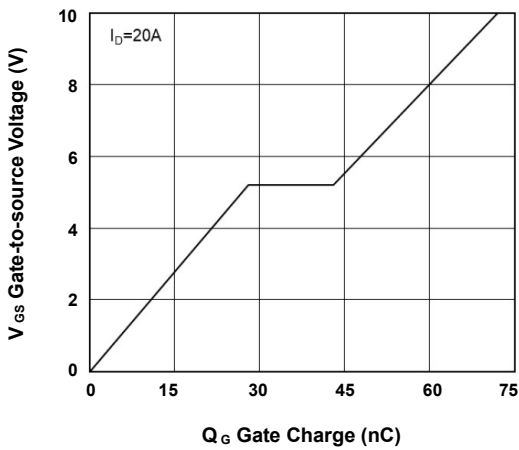


FIG.7-Gate Charge Characteristics

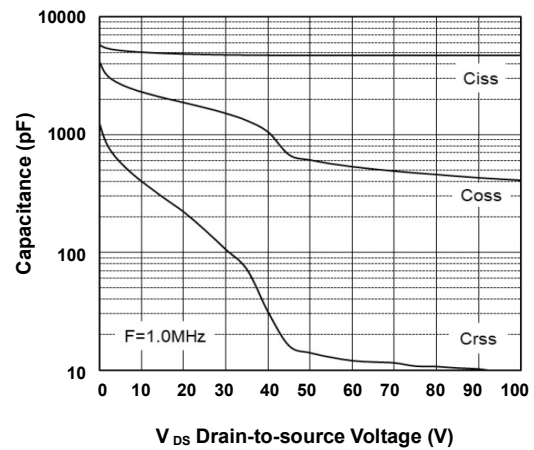


FIG.8-Capacitance Characteristics

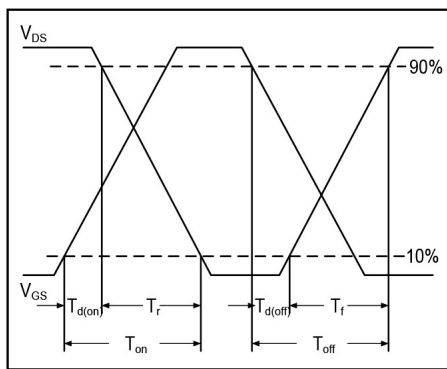


FIG.9-Switching Time Waveform

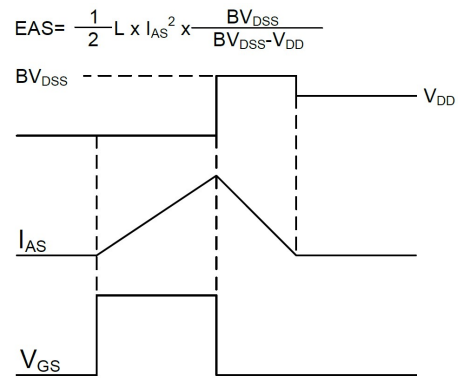


FIG.10-Unclamped Inductive Switching Waveform

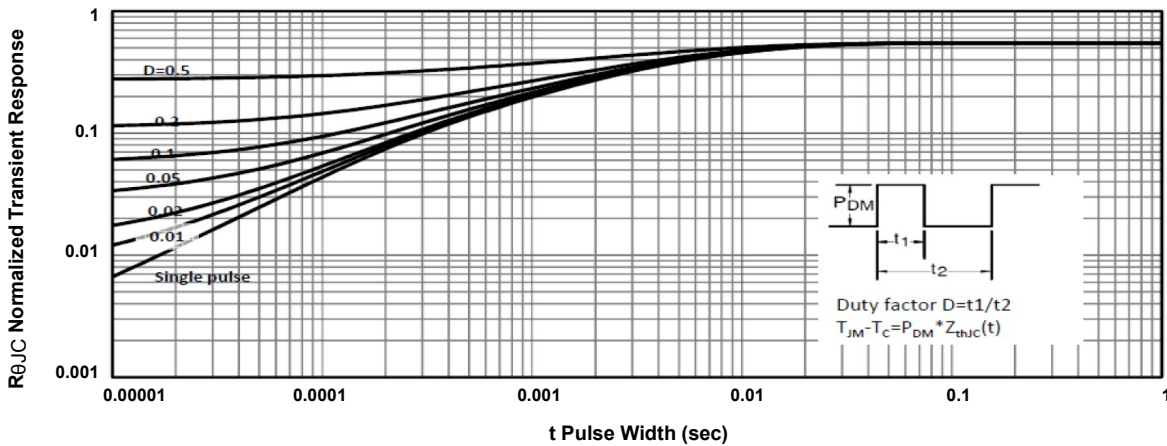


FIG.11-Normalized Maximum Transient Thermal Impedance

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