AF9945N

N-Channel Enhancement Mode Power MOSFET

■ Features

- Low On-resistance
- Single Drive Requirement
- Surface Mount Package

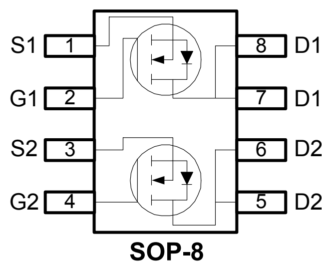
■ General Description

The Advanced Power MOSFET provides the designer with the best combination of fast switching, ruggedized device design, ultra low on-resistance and cost-effectiveness.

■ Product Summary

BV_{DSS} (V)	$r_{DS(on)}$ (mΩ)	I_D (A)
60	90	3.5

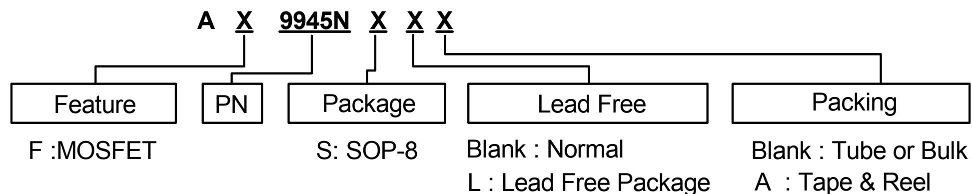
■ Pin Assignments



■ Pin Descriptions

Pin Name	Description
S1/2	Source
G1/2	Gate
D1/2	Drain

■ Ordering information



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■ Absolute Maximum Ratings

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		60	V
V_{GS}	Gate-Source Voltage		±25	V
I_D	Continuous Drain Current **(Note 1)**	T_A=25ºC	3.5	A
		T_A=70ºC	2.8	
I_{DM}	Pulsed Drain Current **(Note 2)**		20	A
P_D	Total Power Dissipation	T_A=25ºC	2	W
	Linear Derating Factor		0.016	W/ºC
T_{STG}	Storage Temperature Range		-55 to 150	ºC
T_J	Operating Junction Temperature Range		-55 to 150	ºC

■ Thermal Resistance Ratings

Symbol	Parameter		Value	Units
Rthj-a	Thermal Resistance Junction-Ambient **(Note 1)**	Max.	62.5	ºC/W

Note 1: Surface mounted on 1 in^2 copper pad of FR4 board, t≤10sec; 135ºC/W when mounted on Min. copper pad.
Note 2: Pulse width limited by Max. junction temperature.

■ Electrical Characteristics at T_J=25ºC (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	60	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	Reference to 25ºC, I_D=1mA	-	0.04	-	V/ºC
$R_{DS(on)}$	Static Drain-Source On-Resistance **(Note 3)**	V_{GS}=10V, I_D=3A	-	-	90	mΩ
		V_{GS}=4.5V, I_D=2A	-	-	120	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=3A	-	6	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=60V, V_{GS}=0V, T_J=25ºC	-	-	10	uA
		V_{DS}=48V, V_{GS}=0V, T_J=70ºC	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±25V	-	-	±100	nA
Q_g	Total Gate Charge **(Note 3)**	I_D=3A, V_{DS}=48V, V_{GS}=4.5V	-	6	10	nC
Q_{gs}	Gate-Source Charge		-	2	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge		-	3	-	nC
$t_{d(on)}$	Turn-On Delay Time **(Note 3)**	V_{DS}=30V, I_D=1A, R_G=3.3Ω, V_{GS}=10V R_D=30Ω	-	6	-	ns
t_r	Rise Time		-	5	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	16	-	ns
t_f	Fall-Time		-	3	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1.0MHz	-	510	810	pF
C_{oss}	Output Capacitance		-	55	-	pF
C_{rss}	Reverse Transfer Capacitance		-	35	-	pF
R_G	Gate Resistance	f=1.0MHz	-	1.3	-	Ω

■ Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage **(Note 3)**	I_S=1.7A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time **(Note 3)**	I_S=4A, V_{GS}=0V, dI/dt=100A/µs	-	27	-	ns
Q_{rr}	Reverse Recovery Charge		-	32	-	nC

Note3: Pulse width ≤ 300us, duty cycle ≤ 2%.

■ Typical Performance Characteristics

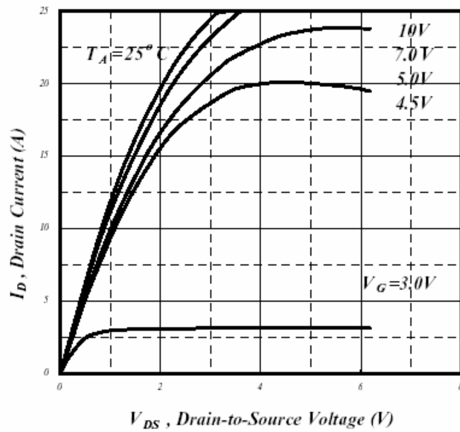


Fig 1. Typical Output Characteristics

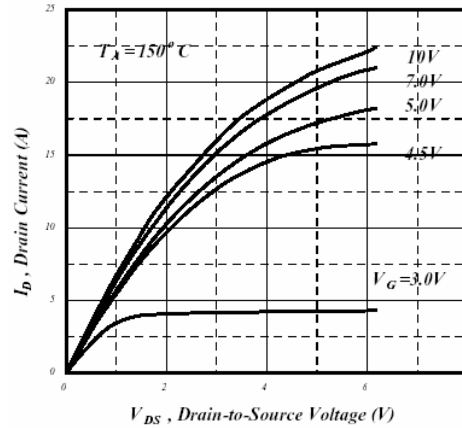


Fig 2. Typical Output Characteristics

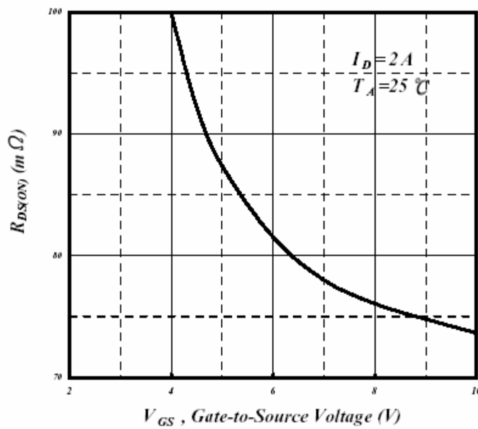


Fig 3. On-Resistance v.s. Gate Voltage

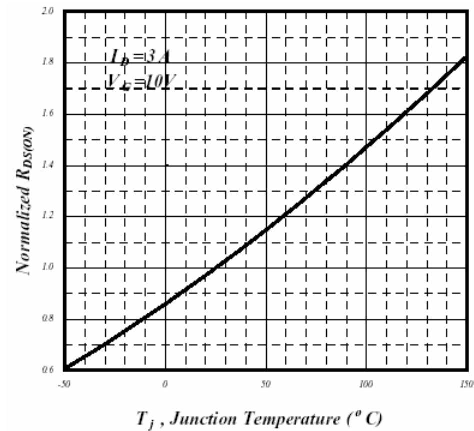


Fig 4. Normalized On-Resistance v.s. Junction Temperature

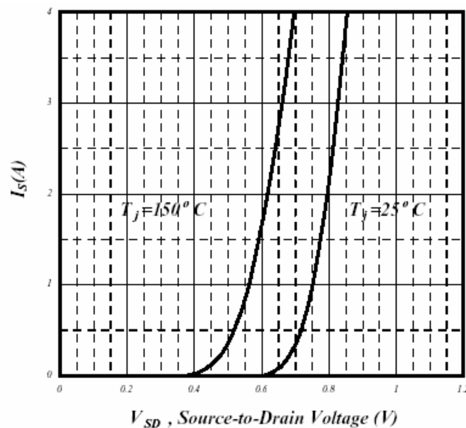


Fig 5. Forward Characteristic of Reverse Diode

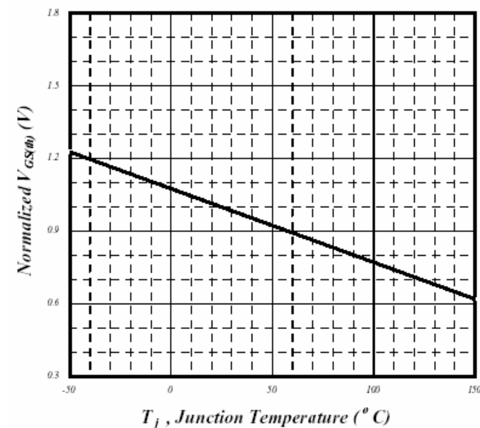


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

■ Typical Performance Characteristics (Continued)

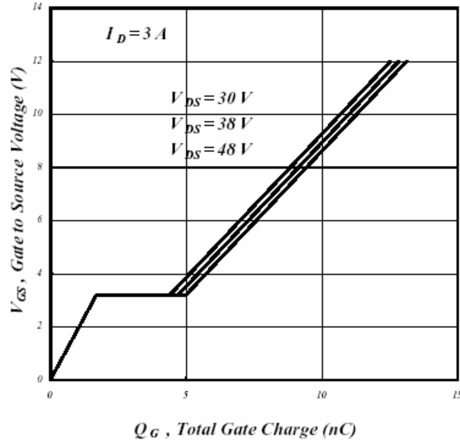


Fig 7. Gate Charge Characteristics

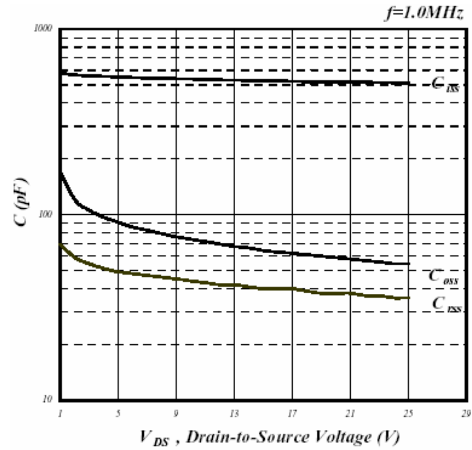


Fig 8. Typical Capacitance Characteristics

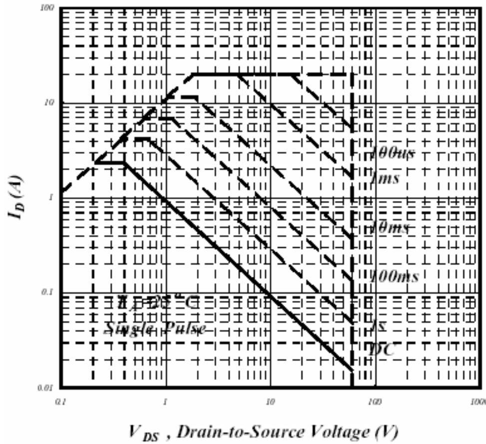


Fig 9. Maximum Safe Operating Area

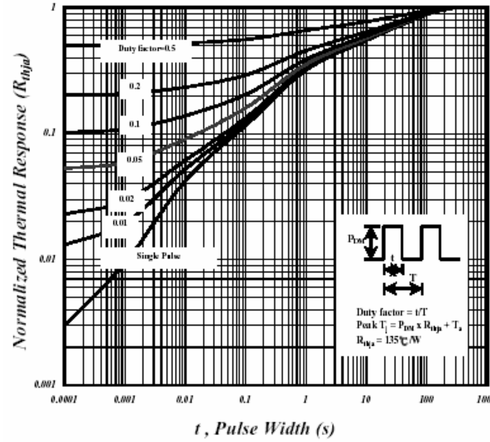


Fig 10. Effective Transient Thermal Impedance

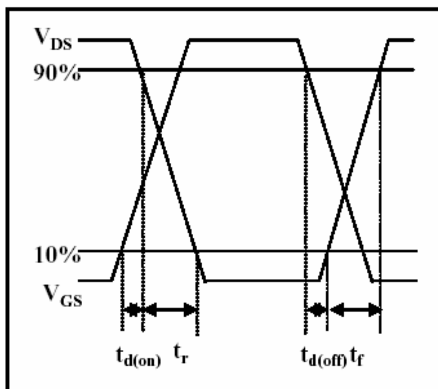


Fig 11. Switching Time Waveform

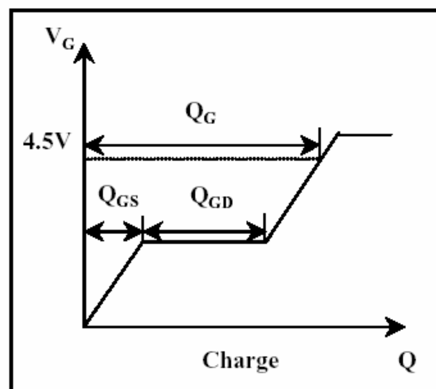
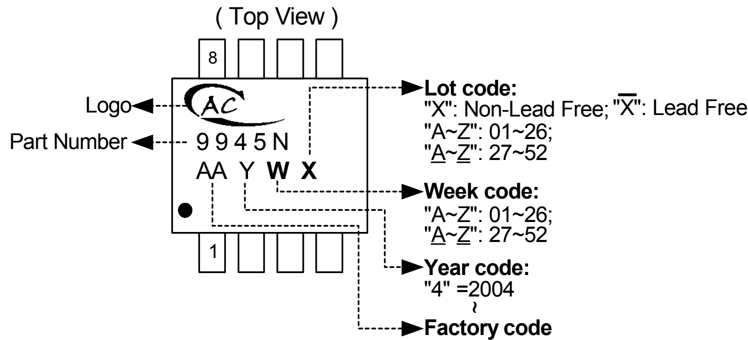


Fig 12. Gate Charge Waveform

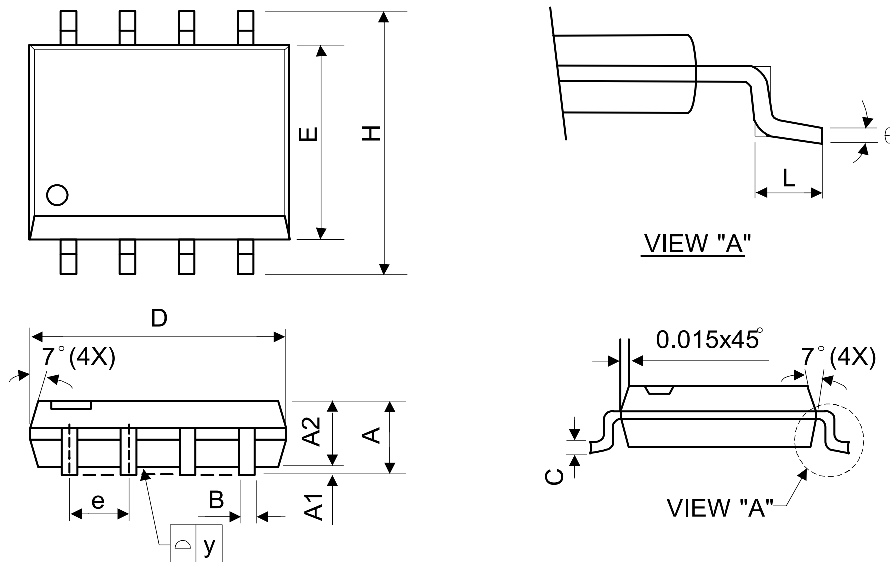
■ Marking Information

SOP-8L



■ Package Information

Package Type: SOP-8L



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.40	1.60	1.75	0.055	0.063	0.069
A1	0.10	-	0.25	0.040	-	0.100
A2	1.30	1.45	1.50	0.051	0.057	0.059
B	0.33	0.41	0.51	0.013	0.016	0.020
C	0.19	0.20	0.25	0.0075	0.008	0.010
D	4.80	5.05	5.30	0.189	0.199	0.209
E	3.70	3.90	4.10	0.146	0.154	0.161
e	-	1.27	-	-	0.050	-
H	5.79	5.99	6.20	0.228	0.236	0.244
L	0.38	0.71	1.27	0.015	0.028	0.050
y	-	-	0.10	-	-	0.004
θ	0°	-	8°	0°	-	8°