

N-Channel Enhancement Mode Power MOSFET

■ Features

- Low Gate Charge
- Single Drive Requirement
- Surface Mount Package
- Pb Free Plating Product

■ Product Summary

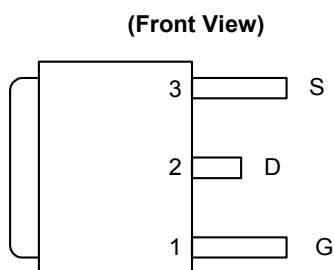
BV_{DSS} (V)	$R_{DS(ON)}$ (m Ω)	I_D (A)
60	100	11

■ General Description

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

The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

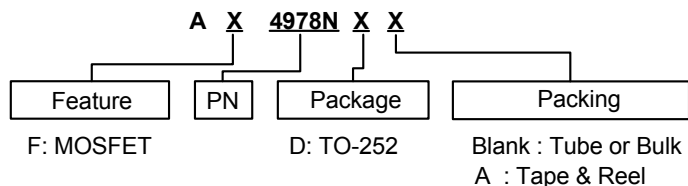
■ Pin Assignments



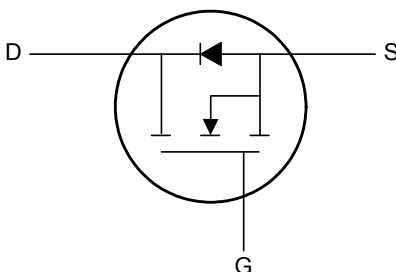
■ Pin Descriptions

Pin Name	Description
S	Source
G	Gate
D	Drain

■ Ordering information



■ Block Diagram



**AF4978N****N-Channel Enhancement Mode Power MOSFET****■ 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, V _{GS} =10V	T _C =25°C	11	A
		T _C =100°C	6.8	
I _{DM}	Pulsed Drain Current (Note 1)		45	A
P _D	Total Power Dissipation	T _C =25°C	21	W
	Linear Derating Factor		0.17	W/°C
T _{STG}	Storage Temperature Range		-55 to 150	°C
T _J	Operating Junction Temperature Range		-55 to 150	°C

■ Thermal Data

Symbol	Parameter		Maximum	Units
R _{θJC}	Thermal Resistance Junction-Case	Max.	6	°C/W
R _{θJA}	Thermal Resistance Junction- Ambient	Max.	110	°C/W

■ Electrical Characteristics at $T_J=25^{\circ}C$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	Reference to $25^{\circ}C$, $I_D=1mA$	-	0.04	-	$V/^{\circ}C$
$R_{DS(ON)}$	Static Drain-Source On-Resistance (Note 2)	$V_{GS}=10V, I_D=5A$	-	-	100	m Ω
		$V_{GS}=4.5V, I_D=4A$	-	-	125	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=5A$	-	7	-	S
I_{DSS}	Drain-Source Leakage Current ($T_J=25^{\circ}C$)	$V_{DS}=60V, V_{GS}=0V$	-	-	10	μA
	Drain-Source Leakage Current ($T_J=150^{\circ}C$)	$V_{DS}=48V, V_{GS}=0V$	-	-	25	
I_{GSS}	Gate-Source Leakage	$V_{GS}=\pm 25V$	-	-	± 100	nA
Q_g	Total Gate Charge (Note 2)	$I_D=5A,$	-	6	10	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=48V,$	-	2	-	
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=4.5V$	-	3	-	
$t_{d(on)}$	Turn-On Delay Time (Note 2)	$V_{DS}=30V,$	-	6	-	ns
t_r	Rise Time	$I_D=5A,$	-	11	-	
$t_{d(off)}$	Turn-Off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	14	-	
t_f	Fall-Time	$R_D=6\Omega$	-	2	-	
C_{iss}	Input Capacitance	$V_{GS}=0V,$	-	485	780	pF
C_{oss}	Output Capacitance	$V_{DS}=25V,$	-	55	-	
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	-	40	-	

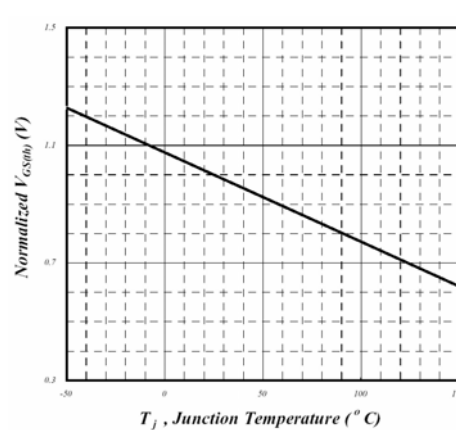
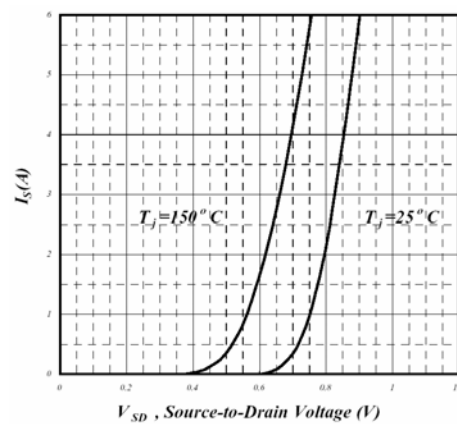
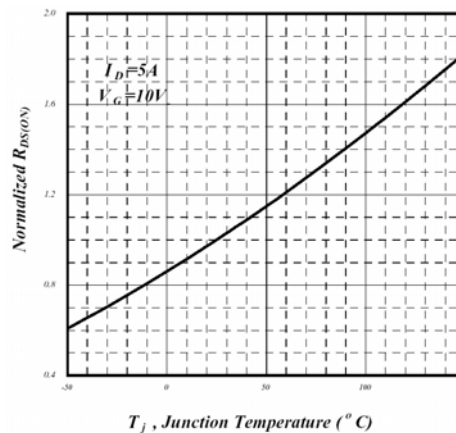
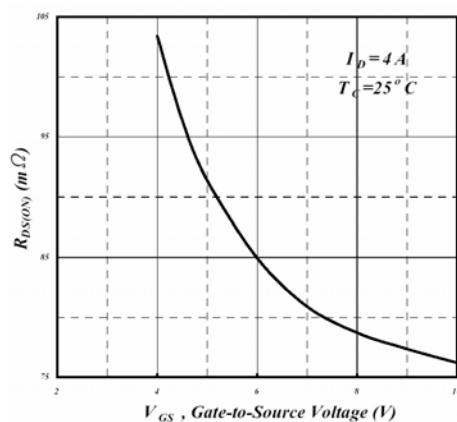
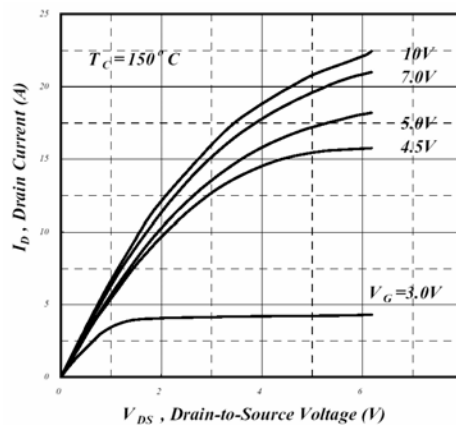
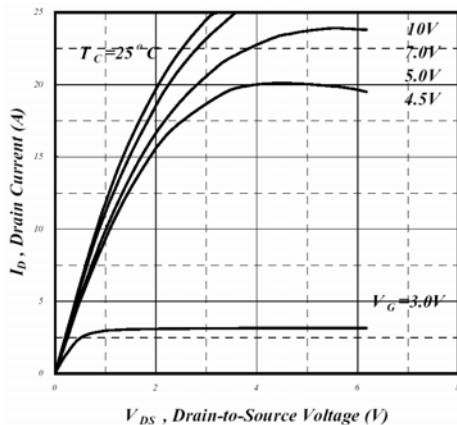
■ Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Forward On Voltage (Note 2)	$I_S=5A, V_{GS}=0V$	-	-	1.2	V
t_{rr}	Reverse Recovery Time	$I_S=5A, V_{GS}=0V,$	-	23	-	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$	-	28	-	nC

Note 1: Pulse width limited by Max. junction temperature.**Note 2:** Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

N-Channel Enhancement Mode Power MOSFET

■ Typical Performance Characteristics



N-Channel Enhancement Mode Power MOSFET

■ Typical Performance Characteristics (Continued)

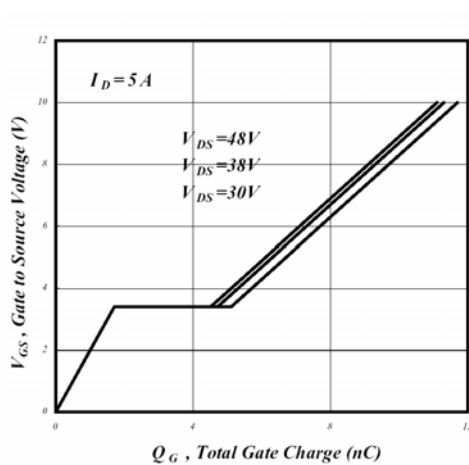


Fig 7. Gate Charge Characteristics

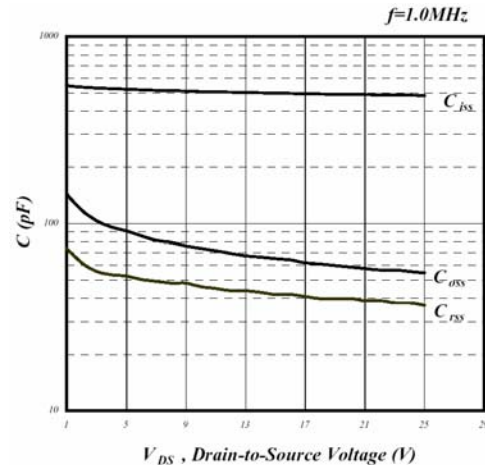


Fig 8. Typical Capacitance Characteristics

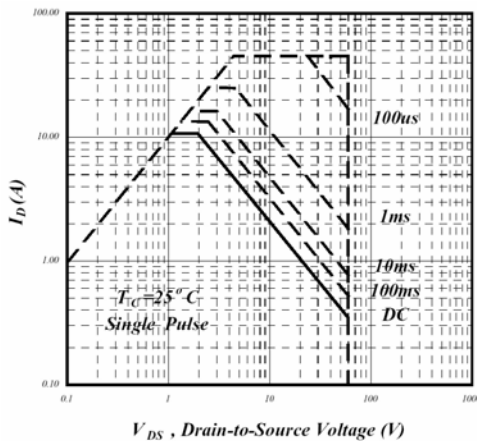


Fig 9. Maximum Safe Operating Area

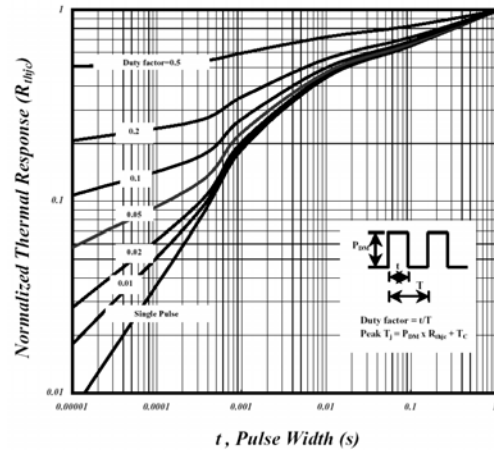


Fig 10. Effective Transient Thermal Impedance

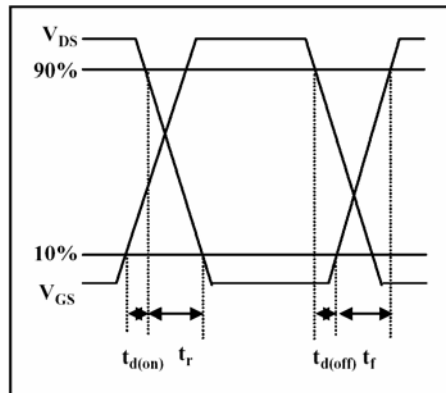


Fig 11. Switching Time Waveform

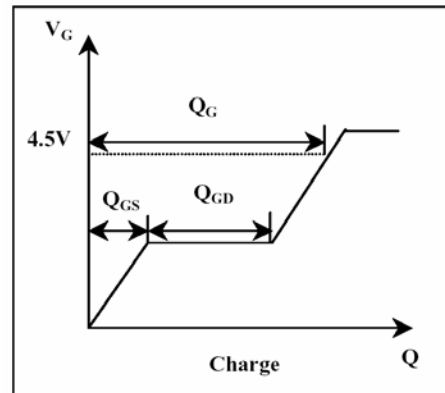
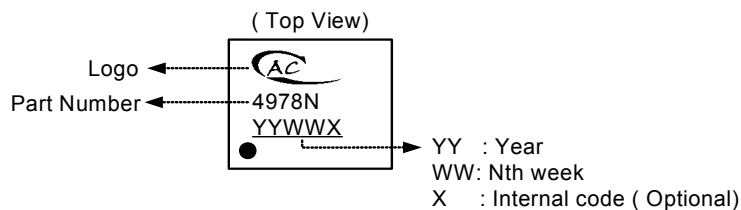


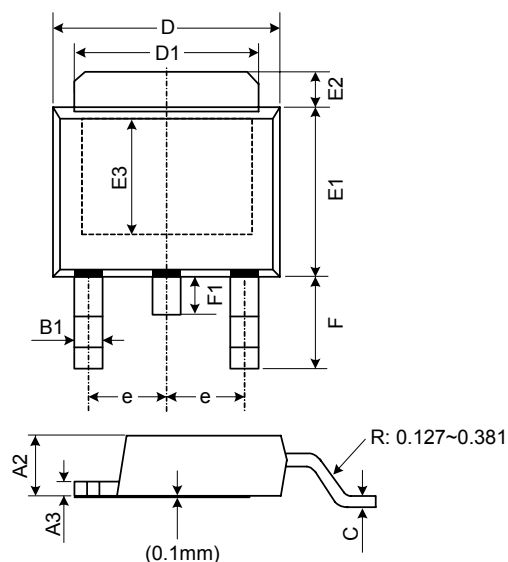
Fig 12. Gate Charge Waveform

N-Channel Enhancement Mode Power MOSFET

■ Marking Information TO-252



■ Package Information Package Type: TO-252



1. All Dimensions Are in Millimeters.
2. Dimension Does Not Include Mold Protrusions.

Symbol	Dimensions In Millimeters		
	Min.	Nom.	Max.
A2	1.80	2.30	2.80
A3	0.40	0.50	0.60
B1	0.40	0.70	1.00
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
F	2.20	2.63	3.05
F1	0.50	0.85	1.20
E1	5.10	5.70	6.30
E2	0.50	1.10	1.70
E3	3.50	4.00	4.50
e	-	2.30	-
C	0.35	0.50	0.65