

P-Channel Enhancement Mode Power MOSFET

■ Features

- Lower On-Resistance
- Simple Drive Requirement
- Fast Switching Characteristic
- RoHS Compliant
- Pb Free Plating Product

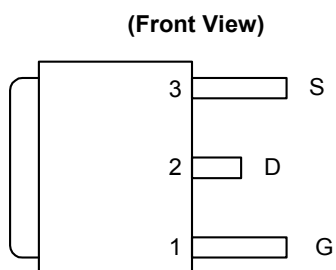
■ General Description

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.

■ Product Summary

BV_{DSS} (V)	$R_{DS(ON)}$ (m Ω)	I_D (A)
-60	160	-10

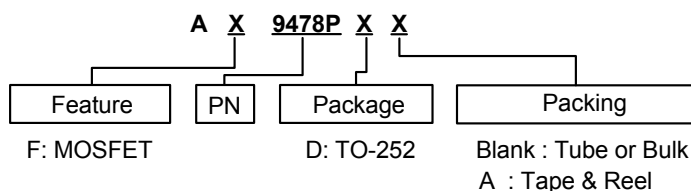
■ Pin Assignments



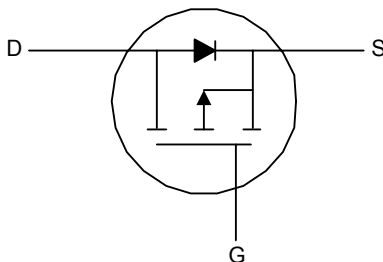
■ Pin Descriptions

Pin Name	Description
S	Source
G	Gate
D	Drain

■ Ordering information



■ Block Diagram



**AF9478P****P-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	-10	A
		T _C =100°C	-6	
I _{DM}	Pulsed Drain Current (Note 1)		45	A
P _D	Total Power Dissipation	T _C =25°C	28	W
	Linear Derating Factor		0.23	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.	4.5	°C/W
R _{θJA}	Thermal Resistance Junction- Ambient	Max.	110	°C/W

■ Electrical Characteristics ($T_J=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
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 $25^\circ C$, $I_D=-1mA$	-	-0.06	-	V/ $^\circ C$
$R_{DS(ON)}$	Static Drain-Source On-Resistance (Note 2)	$V_{GS}=-10V, I_D=-5A$	-	-	160	m Ω
		$V_{GS}=-4.5V, I_D=-3A$	-	-	200	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-	-3	V
g_{fs}	Forward Transconductance	$V_{DS}=-10V, I_D=-5A$	-	6	-	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)	$I_D=-5A$	-	10	16	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=-48V$	-	2	-	
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=-4.5V$	-	4	-	
$t_{d(on)}$	Turn-On Delay Time (Note 2)	$V_{DS}=-30V$	-	10	-	nS
t_r	Rise Time	$I_D=-5A$	-	13	-	
$t_{d(off)}$	Turn-Off Delay Time	$R_G=3.3\Omega, V_{GS}=-10V$	-	34	-	
t_f	Fall-Time	$R_D=6\Omega$	-	29	-	
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	760	1220	pF
C_{oss}	Output Capacitance	$V_{DS}=-25V, f=1.0MHz$	-	80	-	
C_{rss}	Reverse Transfer Capacitance		-	60	-	

■ 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 (Note 2)	$I_S=-5A, V_{GS}=0V,$	-	45	-	ns
Q_{rr}	Reverse Recovery Charge	$dI/dt=-100A/\mu s$	-	107	-	nC

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Note 1: Pulse width limited by safe operating area.

Note 2: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

Typical Performance Characteristics

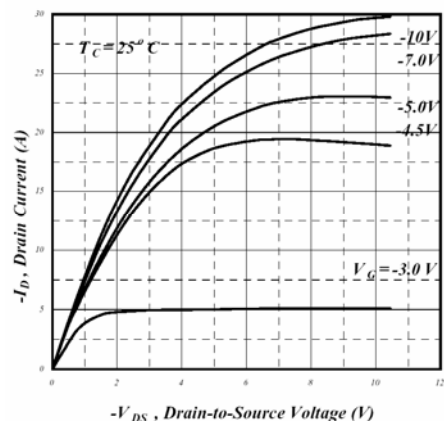


Fig 1. Typical Output Characteristics

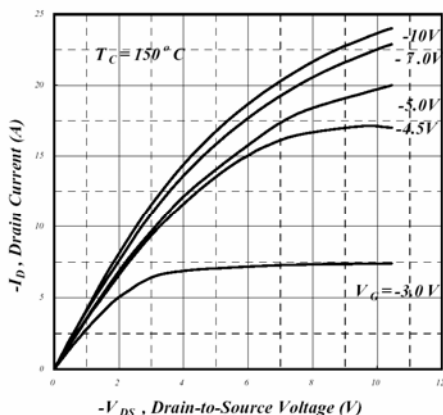


Fig 2. Typical Output Characteristics

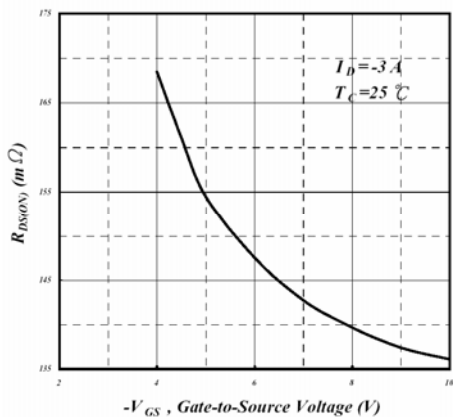


Fig 3. On-Resistance v.s. Gate Voltage

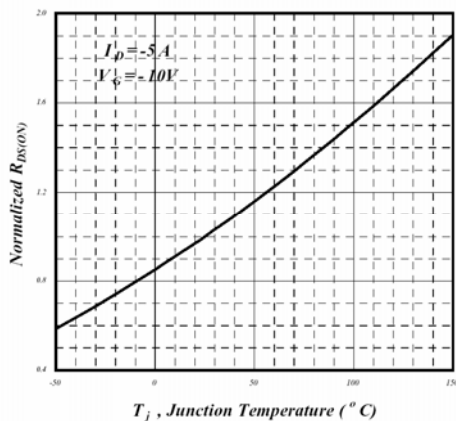


Fig 4. Normalized On-Resistance v.s. Junction Temperature

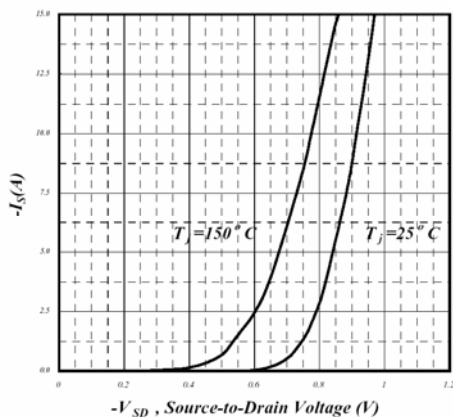


Fig 5. Forward Characteristic of Reverse Diode

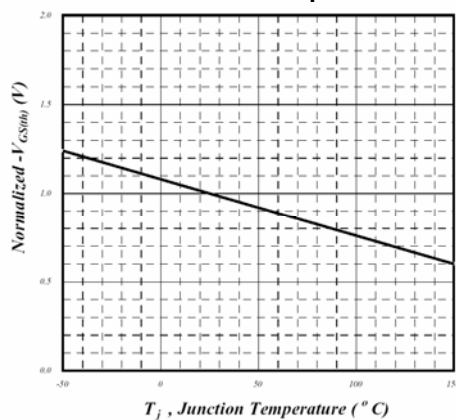


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

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■ Typical Performance Characteristics (Continued)

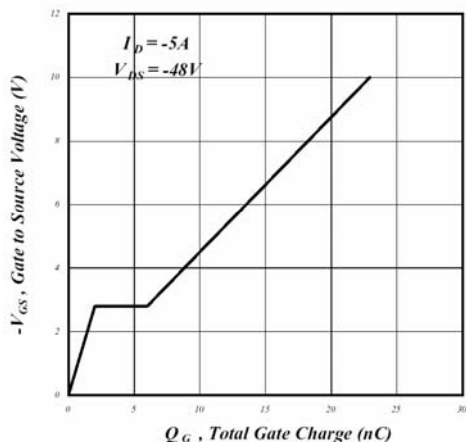


Fig 7. Gate Charge Characteristics

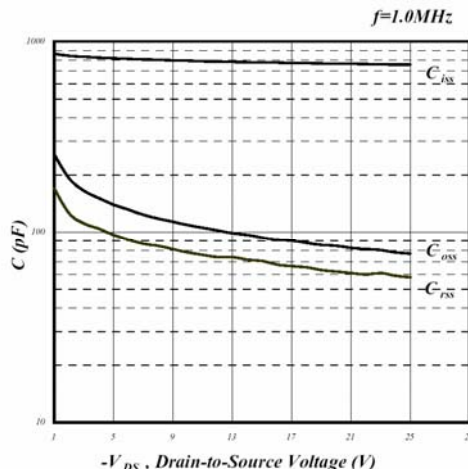


Fig 8. Typical Capacitance Characteristics

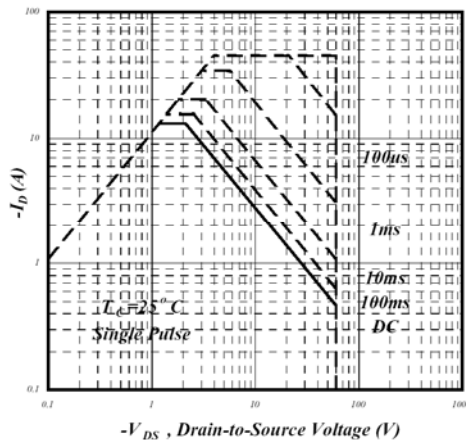


Fig 9. Maximum Safe Operating Area

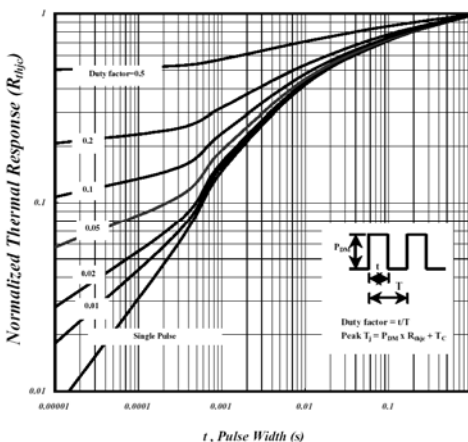


Fig10. Effective Transient Thermal Impedance

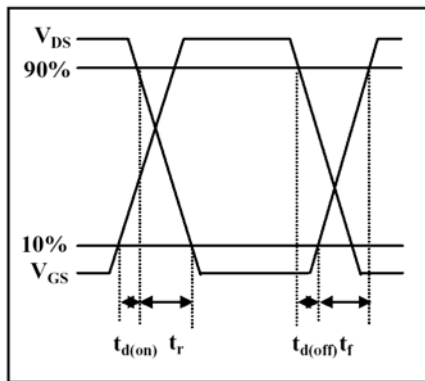


Fig 11. Switching Time Waveform

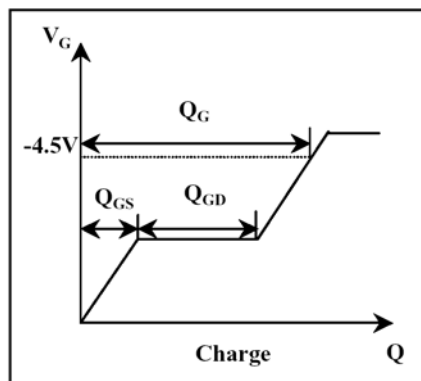
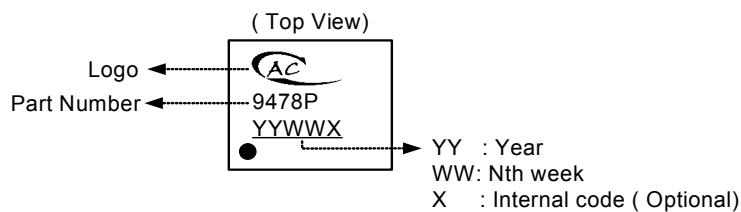


Fig 12. Gate Charge Waveform

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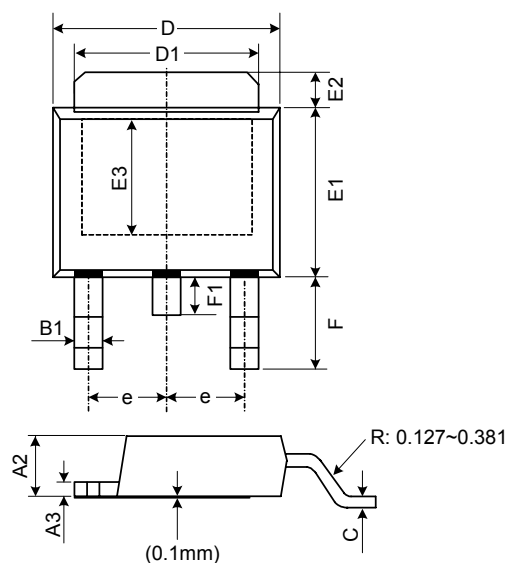
■ Marking Information

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