AF60N03

N-Channel Enhancement Mode Power MOSFET

■ Features

- Simple Drive Requirement
- Low Gate Charge
- Fast Switching
- RoHS Compliant
- Pb Free Plating Product

■ 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.

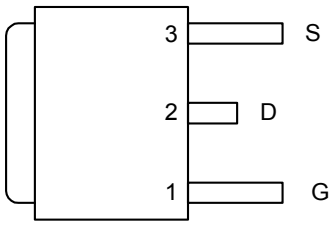
The TO-252 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

■ Product Summary

BV_{DSS} (V)	$R_{DS(ON)}$ (mΩ)	I_D (A)
30	12	45

■ Pin Assignments

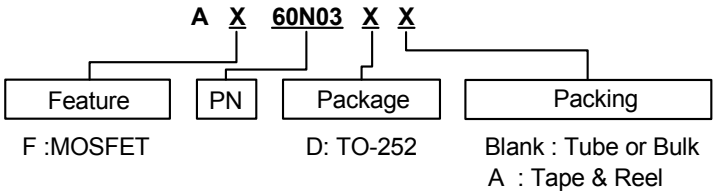
(Front View)



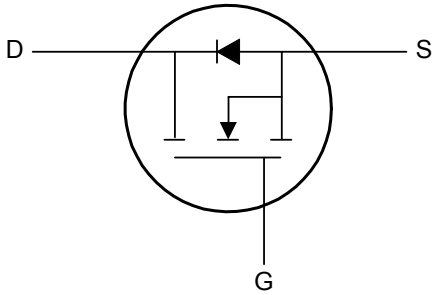
■ Pin Descriptions

Pin Name	Description
S	Source
G	Gate
D	Drain

■ Ordering information



■ Block Diagram



■ Absolute Maximum Ratings

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		30	V
V_{GS}	Gate-Source Voltage		±20	V
I_D	Continuous Drain Current, V_{GS}=10V	T_C=25ºC	45	A
		T_C=100ºC	32	
I_{DM}	Pulsed Drain Current **(Note 1)**		120	A
P_D	Total Power Dissipation	T_C=25ºC	44	W
	Linear Derating Factor		0.352	W/ºC
T_{STG}	Storage Temperature Range		-55 to 175	ºC
T_J	Operating Junction Temperature Range		-55 to 175	ºC

■ Thermal Data

Symbol	Parameter		Maximum	Units
$R_{\theta JC}$	Thermal Resistance Junction-Case	Max.	3.4	ºC/W
$R_{\theta JA}$	Thermal Resistance Junction- Ambient	Max.	110	ºC/W

■ Electrical Characteristics (T_J=25ºC unless otherwise noted)

Symbol	Parameter	Test Conditions	Limits			Unit
			Min.	Typ.	Max.	
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	30	-	-	V
$\triangle BV_{DSS}/\triangle T_J$	Breakdown Voltage Temperature Coefficient	Reference to 25ºC, I_D=1mA	-	0.026	-	V/ºC
$R_{DS(ON)}$	Static Drain-Source On-Resistance **(Note 2)**	V_{GS}=10V, I_D=20A	-	-	12	mΩ
		V_{GS}=4.5V, I_D=15A	-	-	25	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance **(Note 2)**	V_{DS}=10V, I_D=10A	-	25	-	S
I_{DSS}	Drain-Source Leakage Current (T_J=25ºC)	V_{DS}=30V, V_{GS}=0V	-	-	1	uA
	Drain-Source Leakage Current (T_J=175ºC)	V_{DS}=24V, V_{GS}=0V	-	-	250	
I_{GSS}	Gate Source Leakage	V_{GS}=±20V	-	-	±100	nA
Q_g	Total Gate Charge **(Note 2)**	I_D=20A V_{DS}=20V V_{GS}=4.5V	-	11.6	-	nC
Q_{gs}	Gate-Source Charge		-	3.9	-	
Q_{gd}	Gate-Drain ("Miller") Charge		-	7	-	
$t_{d(on)}$	Turn-On Delay Time **(Note 2)**	V_{DS}=15V I_D=20A R_G=3.3Ω, V_{GS}=10V R_D=0.75Ω	-	8.8	-	nS
t_r	Rise Time		-	57.5	-	
$t_{d(off)}$	Turn-Off Delay Time		-	18.5	-	
t_f	Fall-Time		-	6.4	-	
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=25V, f=1.0MHz	-	1135	-	pF
C_{oss}	Output Capacitance		-	200	-	
C_{rss}	Reverse Transfer Capacitance		-	135	-	

■ Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Forward On Voltage **(Note 2)**	I_S=45A, V_{GS}=0V	-	-	1.3	V
t_{rr}	Reverse Recovery Time	I_S=20A, V_{GS}=0V, dI/dt=100A/μs	-	23.3	-	ns
Q_{rr}	Reverse Recovery Charge		-	16	-	nC

Note 1: Pulse width limited by safe operating area.
Note 2: Pulse width ≤ 300us, duty cycle ≤ 2%.

■ Typical Performance Characteristics

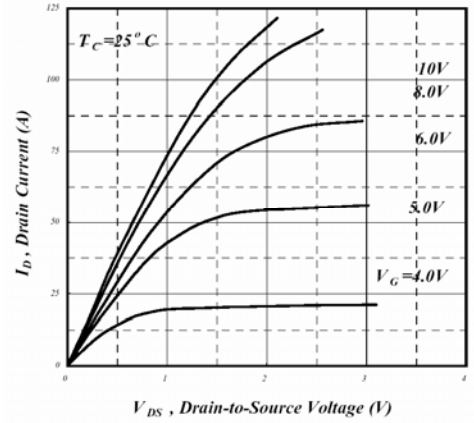


Fig 1. Typical Output Characteristics

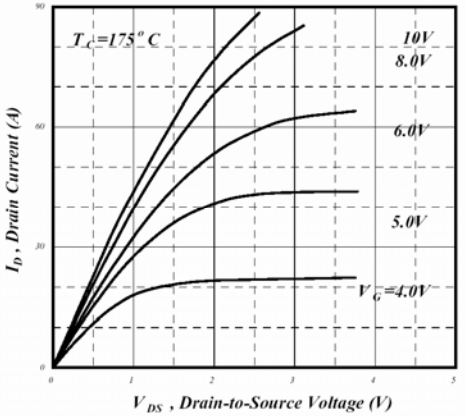


Fig 2. Typical Output Characteristics

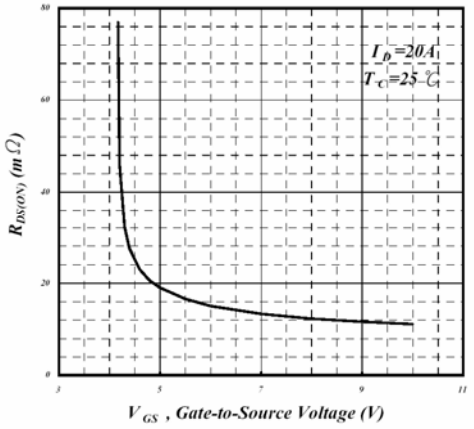


Fig 3. On-Resistance v.s. Gate Voltage

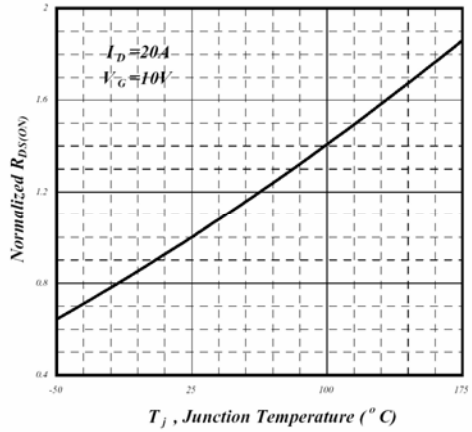


Fig 4. Normalized On-Resistance v.s. Junction Temperature

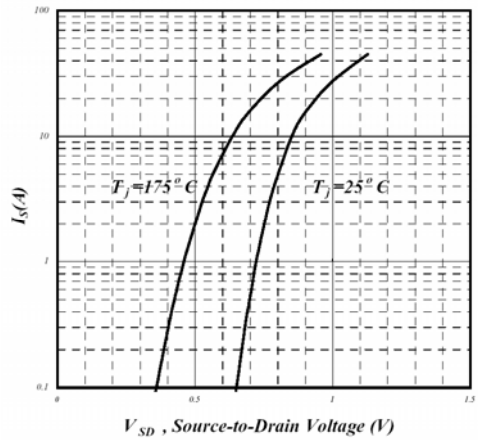


Fig 5. Forward Characteristic of Reverse Diode

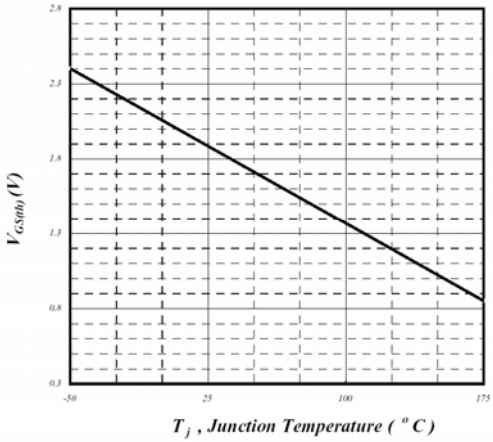


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

■ Typical Performance Characteristics

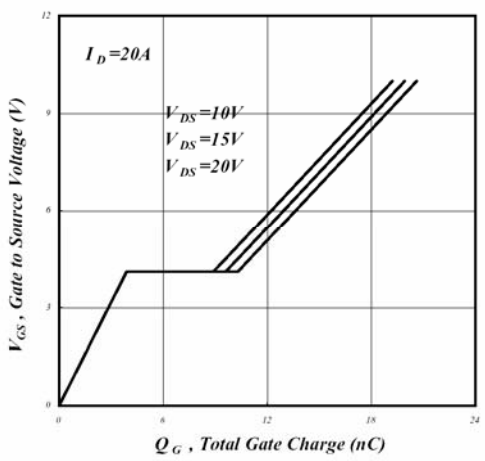


Fig 7. Gate Charge Characteristics

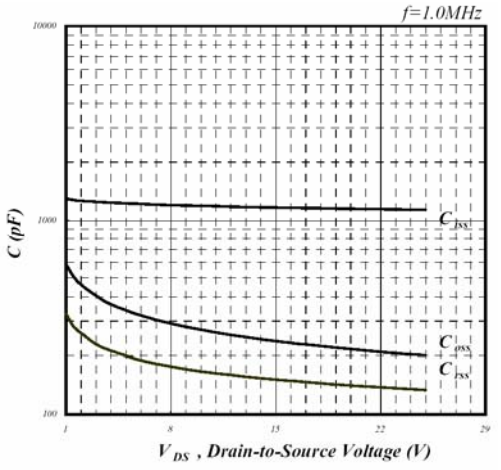


Fig 8. Typical Capacitance Characteristics

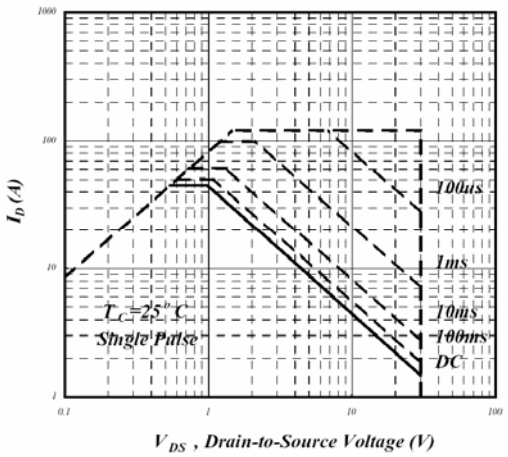


Fig 9. Maximum Safe Operating Area

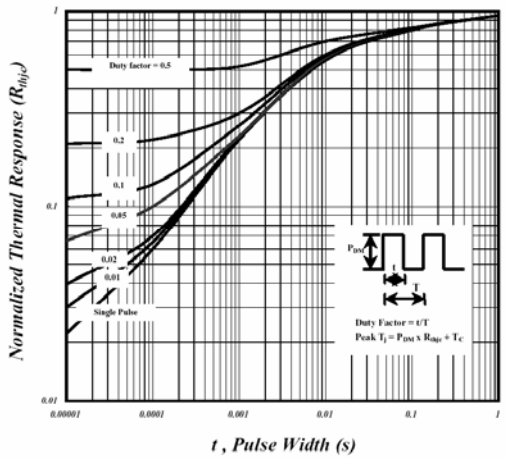


Fig10. Effective Transient Thermal Impedance

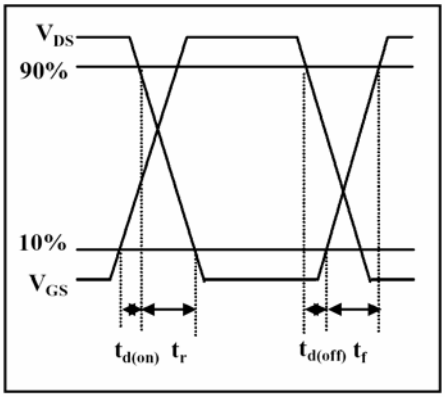


Fig 11. Switching Time Waveform

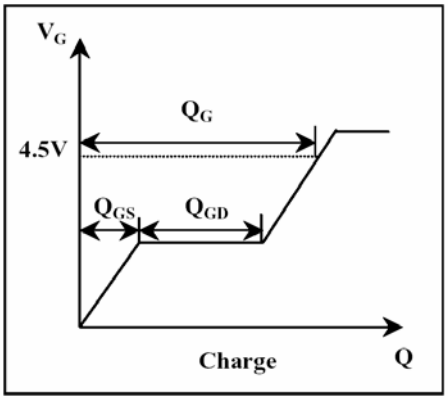
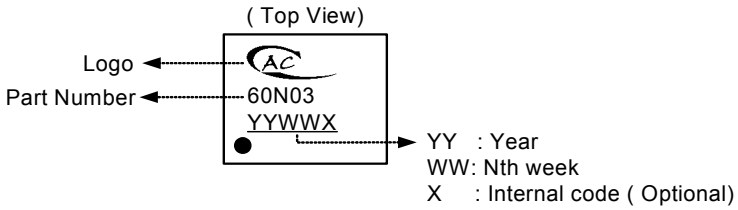


Fig 12. Gate Charge Waveform

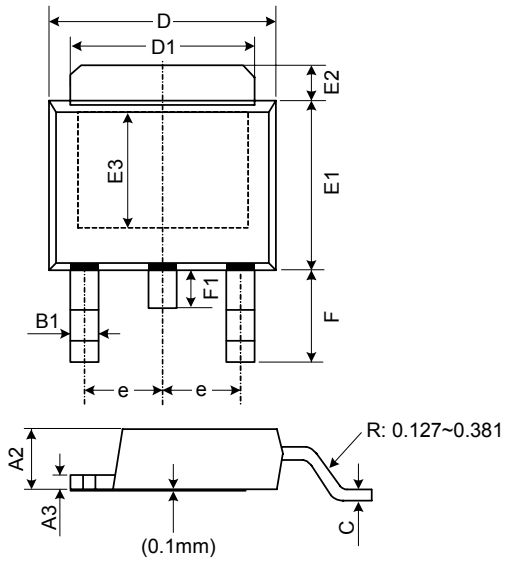
■ Marking Information

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