

N-Channel Enhancement Mode Power MOSFET

■ Features

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

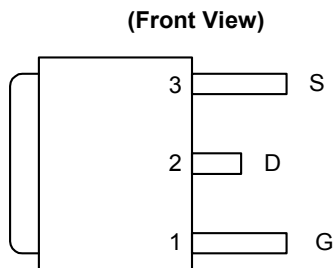
■ General Description

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)} (mΩ)	I _D (A)
25	9	66

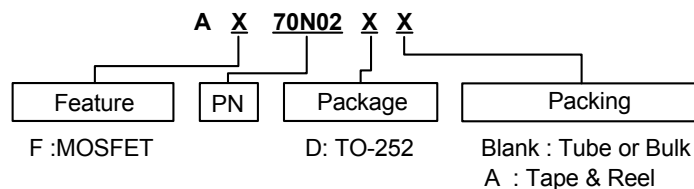
■ Pin Assignments



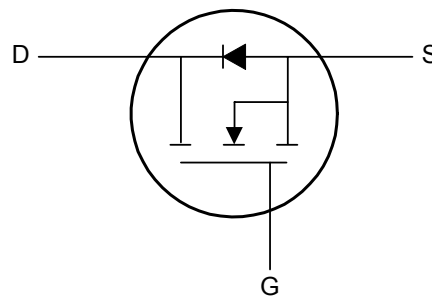
■ Pin Descriptions

Pin Name	Description
S	Source
G	Gate
D	Drain

■ Ordering information



■ Block Diagram





N-Channel Enhancement Mode Power MOSFET

■ Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	25	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current, $V_{GS}=10V$	$T_C=25^\circ C$	66
		$T_C=100^\circ C$	42
I_{DM}	Pulsed Drain Current (Note 1)	210	A
P_D	Total Power Dissipation	$T_C=25^\circ C$	66
	Linear Derating Factor		0.53
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

■ Thermal Data

Symbol	Parameter	Maximum	Units
$R_{\theta JC}$	Thermal Resistance Junction-Case	Max.	1.9
$R_{\theta JA}$	Thermal Resistance Junction- Ambient	Max.	110

■ 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	$V_{GS}=0V, I_D=250\mu A$	25	-	-	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ C$, $I_D=1mA$	-	0.037	-	$V/^\circ C$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=33A$	-	-	9	m Ω
		$V_{GS}=4.5V, I_D=20A$	-	-	18	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=33A$	-	28	-	S
I_{DSS}	Drain-Source Leakage Current($T_J=25^\circ C$)	$V_{DS}=25V, V_{GS}=0V$	-	-	1	uA
	Drain-Source Leakage Current($T_J=150^\circ C$)	$V_{DS}=20V, V_{GS}=0V$	-	-	25	
I_{GSS}	Gate Source Leakage	$V_{GS}=\pm 20V$	-	-	± 100	nA
Q_g	Total Gate Charge (Note 2)	$I_D=33A$	-	23	-	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=20V$	-	3	-	
Q_{gd}	Gate-Drain ("Miller") Charge	$V_{GS}=5V$	-	17	-	
$t_{d(on)}$	Turn-On Delay Time (Note 2)	$V_{DS}=15V$ $I_D=33A$ $R_G=3.3\Omega, V_{GS}=10V$ $R_D=0.45\Omega$	-	8.8	-	nS
t_r	Rise Time		-	95	-	
$t_{d(off)}$	Turn-Off Delay Time		-	24	-	
t_f	Fall-Time		-	14	-	
C_{iss}	Input Capacitance	$V_{GS}=0V$	-	790	-	pF
C_{oss}	Output Capacitance	$V_{DS}=25V,$ $f=1.0MHz$	-	475	-	
C_{rss}	Reverse Transfer Capacitance		-	195	-	

■ Source-Drain Diode

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current (Body Diode)	$V_D=V_G=0V, V_S=1.26V$	-	-	66	A
I_{SM}	Pulsed Source Current (Body Diode) (Note 1)		-	-	210	A
V_{SD}	Forward On Voltage (Note 2)	$T_J=25^\circ C, I_S=66A,$ $V_{GS}=0V$	-	-	1.26	V

N-Channel Enhancement Mode Power MOSFET

Drain-Source Avalanche Ratings

Sym.	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
E_{AS}	Single Pulse Avalanche Energy (Note 2)	$V_{DD}=25V, I_D=35A, L=100\mu H, V_{GS}=10V$	-	-	61	mJ
I_{AR}	Avalanche Current		-	-	35	A

Note 1: Pulse width limited by safe operating area.

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

Typical Performance Characteristics

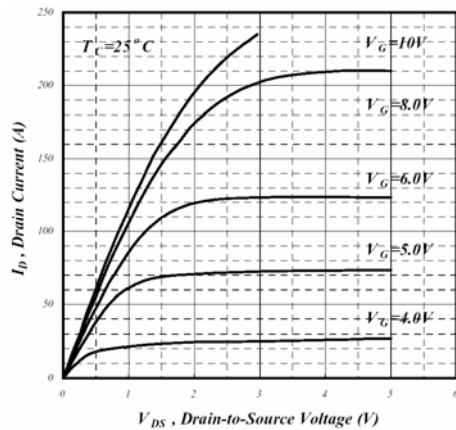


Fig 1. Typical Output Characteristics

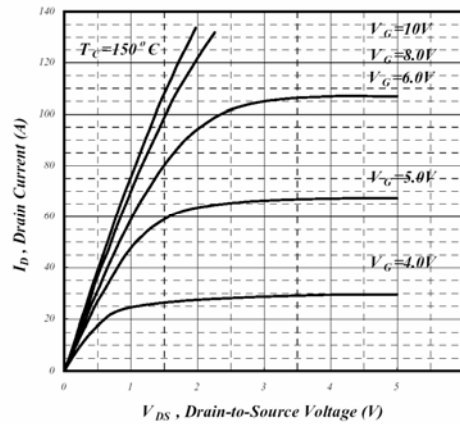


Fig 2. Typical Output Characteristics

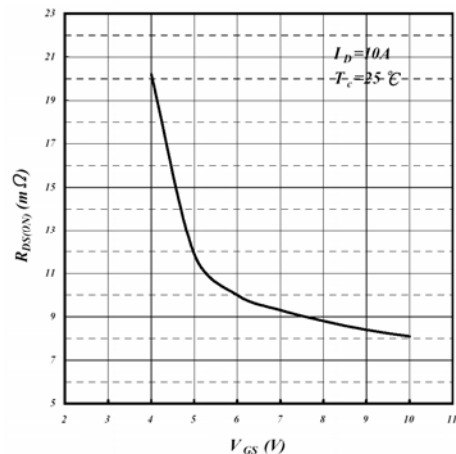


Fig 3. On-Resistance v.s. Gate Voltage

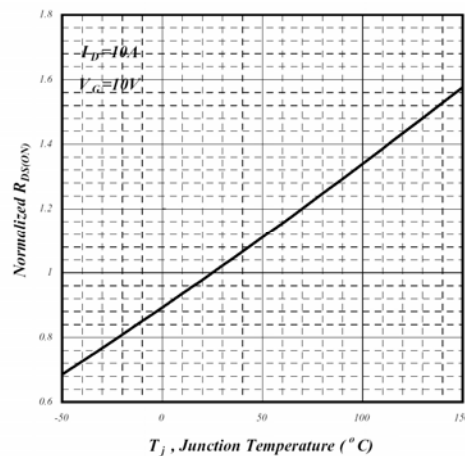


Fig 4. Normalized On-Resistance v.s. Junction Temperature

N-Channel Enhancement Mode Power MOSFET

■ Typical Performance Characteristics (Continued)

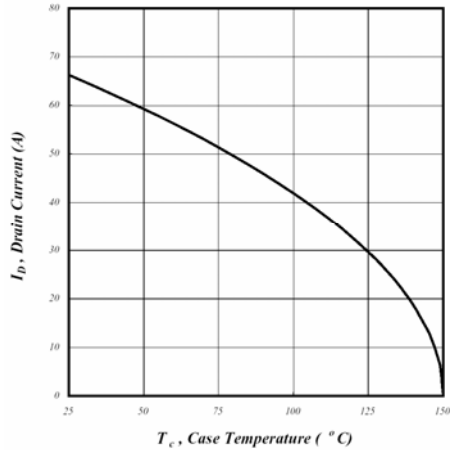


Fig 5. Maximum Drain Current v.s. Case Temperature

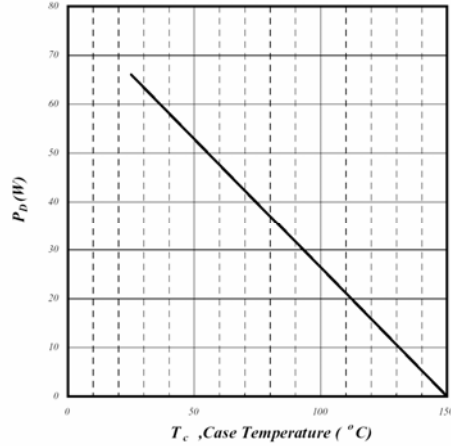


Fig 6. Typical Power Dissipation

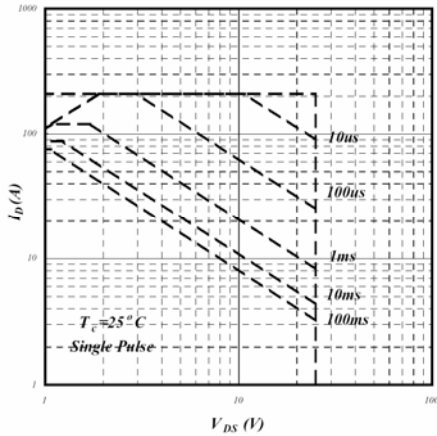


Fig 7. Maximum Safe Operating Area

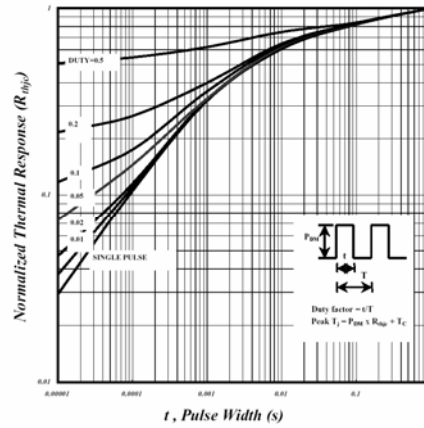


Fig 8. Effective Transient Thermal Impedance

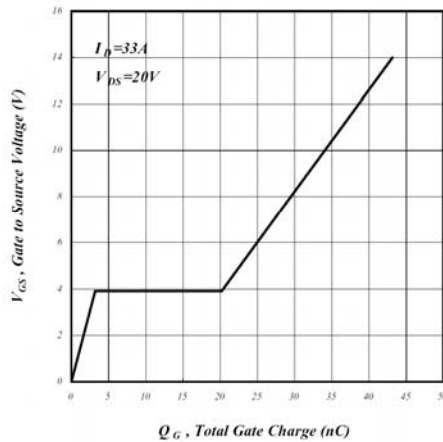


Fig 9. Gate Charge Characteristics

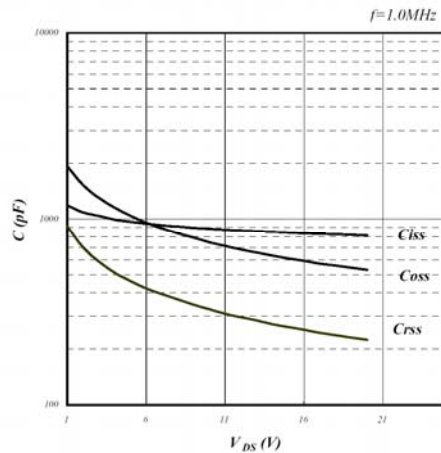


Fig 10. Typical Capacitance Characteristics

N-Channel Enhancement Mode Power MOSFET

■ Typical Performance Characteristics (Continued)

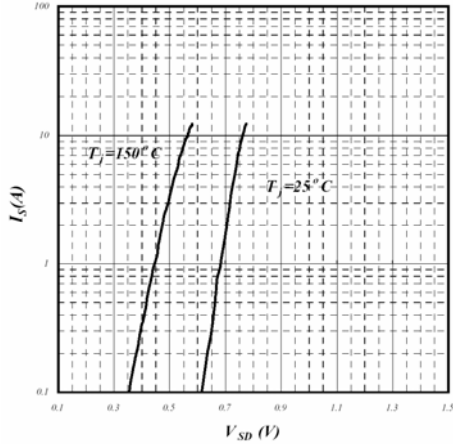


Fig 11. Forward Characteristic of Reverse Diode

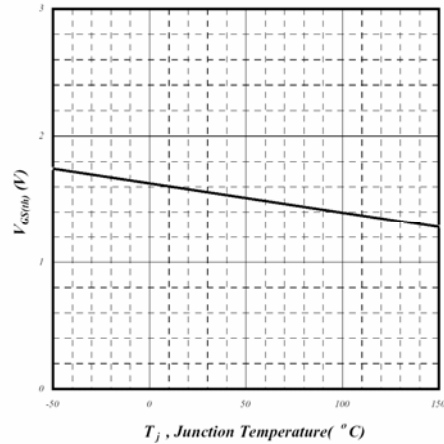


Fig 12. Gate Threshold Voltage v.s. Junction Temperature

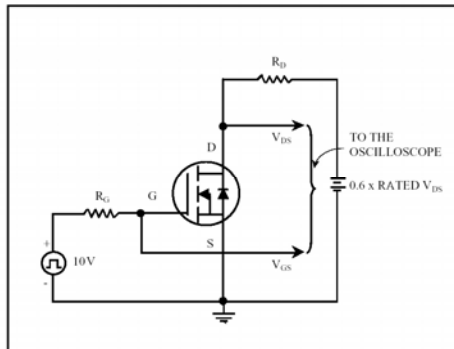


Fig 13. Switching Time Circuit

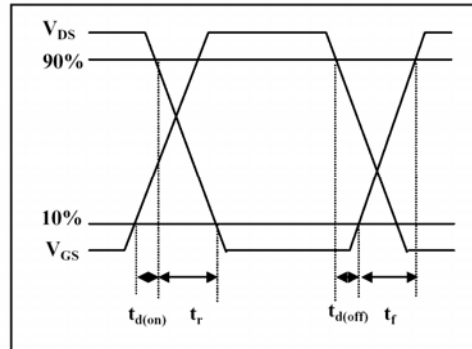


Fig 14. Switching Time Waveform

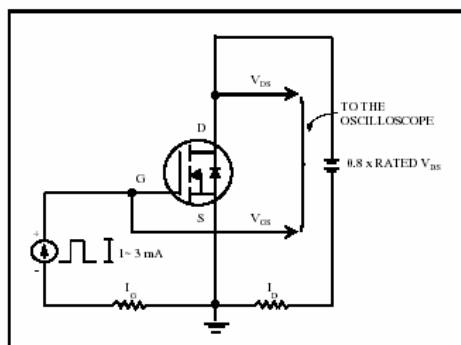


Fig 15. Gate Charge Circuit

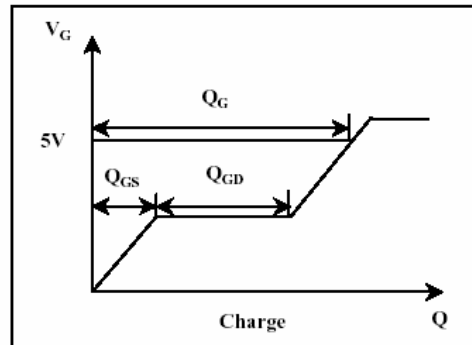
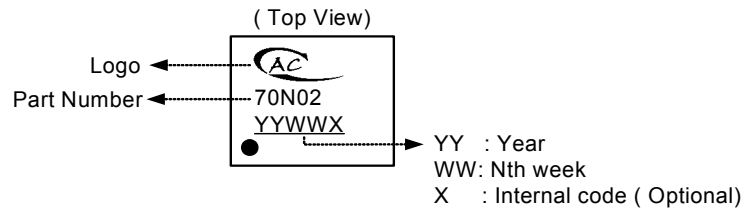


Fig 16. Gate Charge Waveform

N-Channel Enhancement Mode Power MOSFET

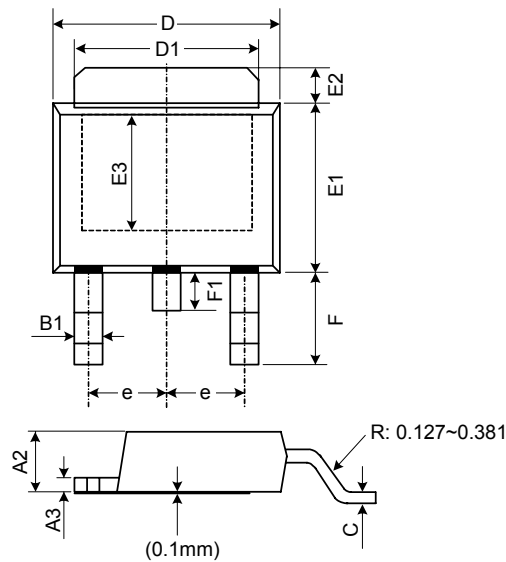
■ Marking Information

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