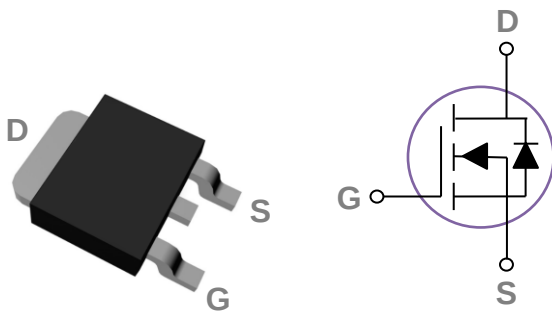


General Description

These N-Channel enhancement mode power field effect transistors are using super junction MOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

TO252 Pin Configuration



Features

- 500V, 11A, $R_{DS(ON)} = 370m\Omega$ @ $V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

Applications

- PFC Power Supply Stages
- Motor Control
- DC-DC Converters
- Adapter

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current – Continuous ($T_C=25^\circ\text{C}$)	11	A
	Drain Current – Continuous ($T_C=100^\circ\text{C}$)	6.9	A
I_{DM}	Drain Current – Pulsed ¹	44	A
EAS	Single Pulse Avalanche Energy	102	mJ
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	62	W
	Power Dissipation – Derate above 25°C	0.5	W/ $^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	2.02	$^\circ\text{C/W}$

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	500	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=500V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=400V$, $V_{GS}=0V$, $T_J=125^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 30V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=3A$	---	320	370	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	2	3.3	4	V

Dynamic and switching Characteristics

Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=400V$, $V_{GS}=10V$, $I_D=6A$	---	11.5	---	nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	1.5	---	
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	5	---	
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DS}=400V$, $V_{GS}=10V$, $R_G=25\Omega$ $I_D=6A$	---	14	---	ns
T_r	Rise Time ^{2, 3}		---	20	---	
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	30	---	
T_f	Fall Time ^{2, 3}		---	25	---	
C_{iss}	Input Capacitance	$V_{DS}=100V$, $V_{GS}=0V$, $F=1\text{MHz}$	---	480	---	pF
C_{oss}	Output Capacitance		---	33	---	
C_{rss}	Reverse Transfer Capacitance		---	3.7	---	
R_g	Total Gate Charge	$V_{GS}=0V$, $V_{DS}=0V$, $F=1\text{MHz}$	---	2	---	Ω

Guaranteed Avalanche Energy

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy	$V_{DD}=100V$, $L=79.9\text{mH}$, $I_{AS}=1.2A$	58	---	---	mJ

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	11	A
I_{SM}	Pulsed Source Current		---	---	22	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=6A$, $T_J=25^\circ\text{C}$	---	---	1.4	V
t_{rr}	Reverse Recovery Time	$I_S=10A$	---	240	---	ns
Q_{rr}	Reverse Recovery Charge	$di/dt=100A/\mu s$, $T_J=25^\circ\text{C}$	---	2.3	---	μC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

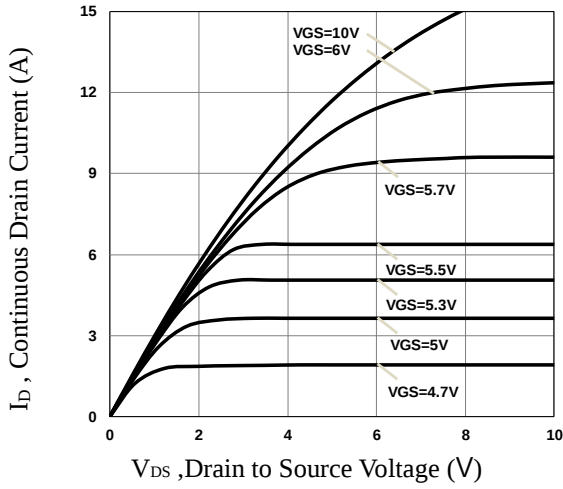


Fig.1 Typical Output Characteristics

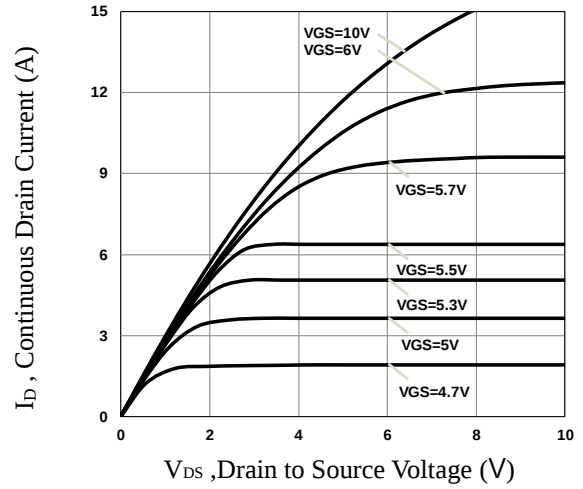


Fig.2 Typical Output Characteristics

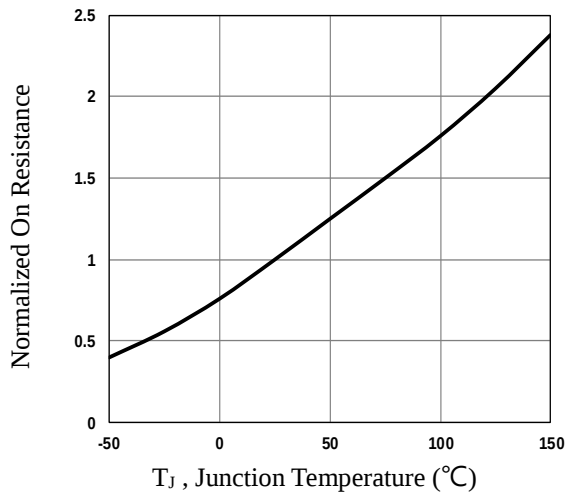


Fig.3 Normalized $R_{DS(on)}$ vs. T_J

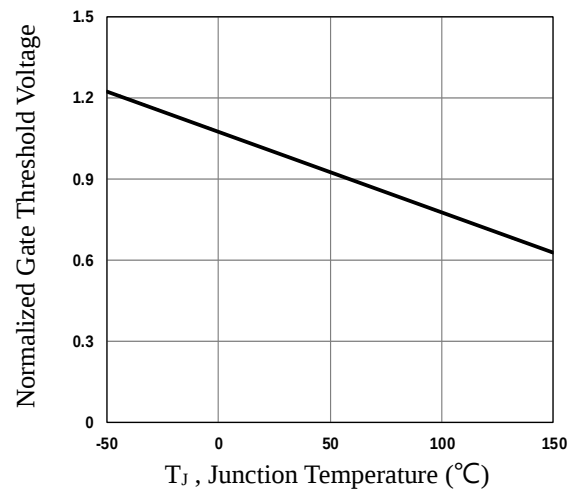


Fig.4 Normalized V_{th} vs. T_J

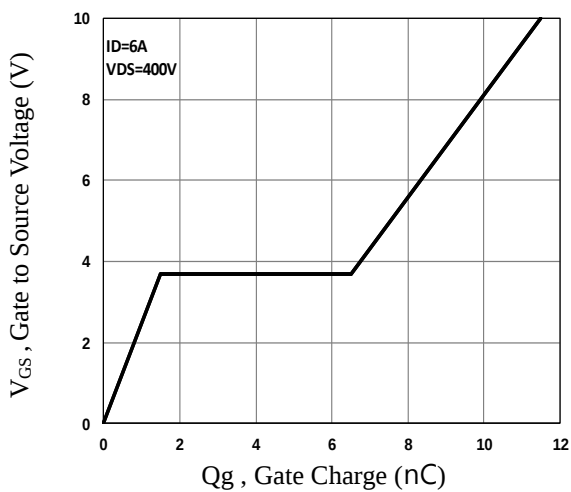


Fig.5 Gate Charge Characteristics

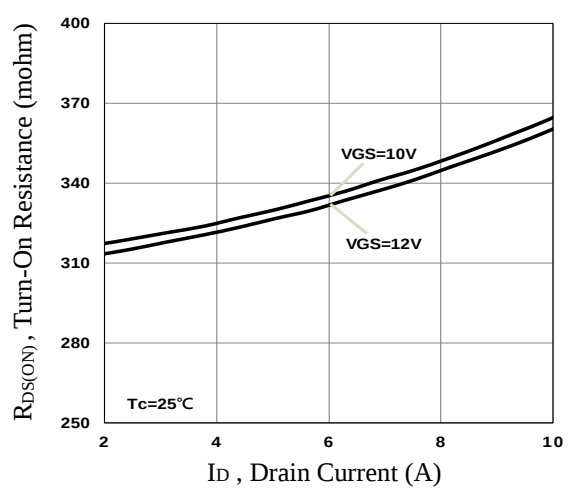
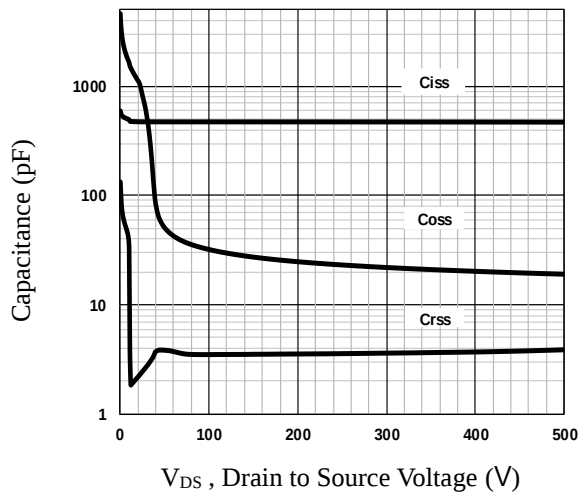
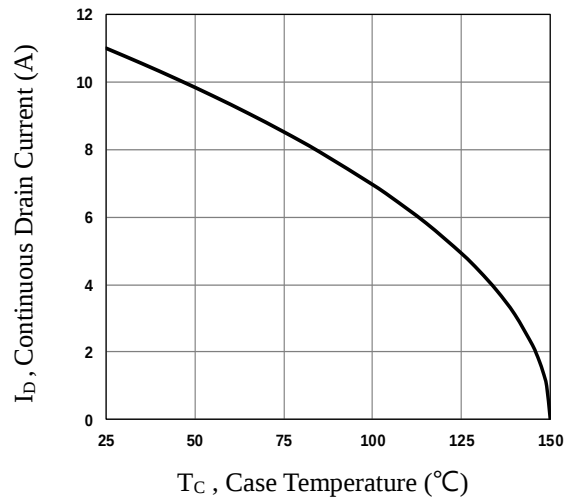
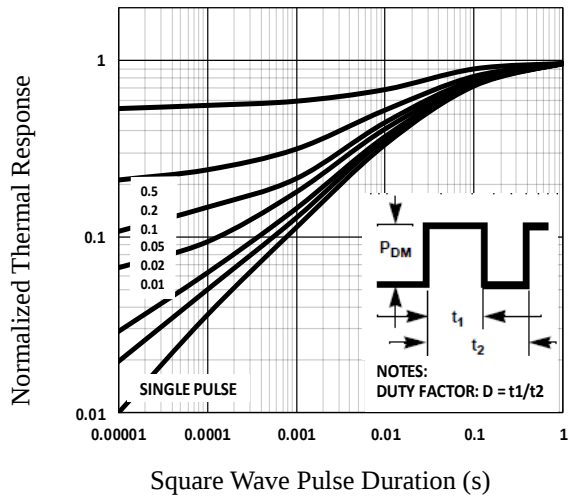
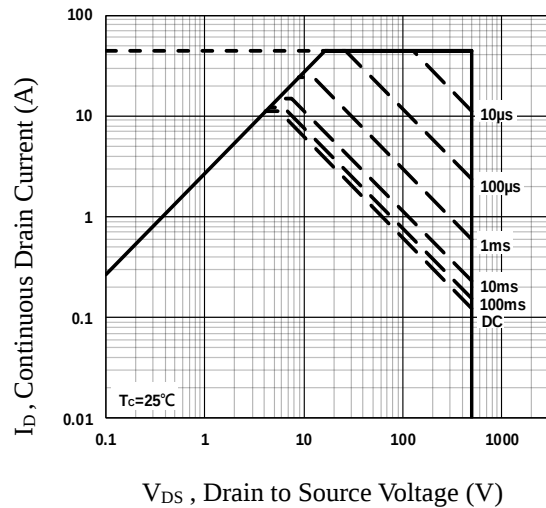
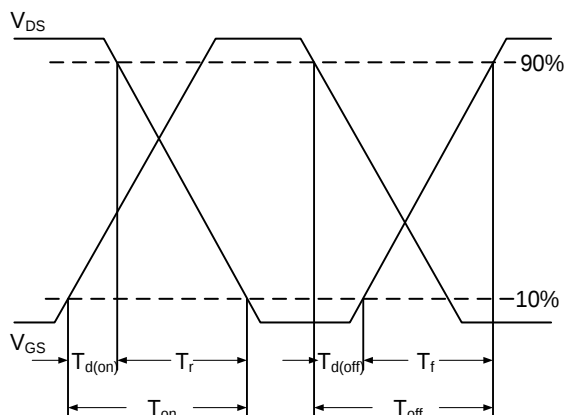
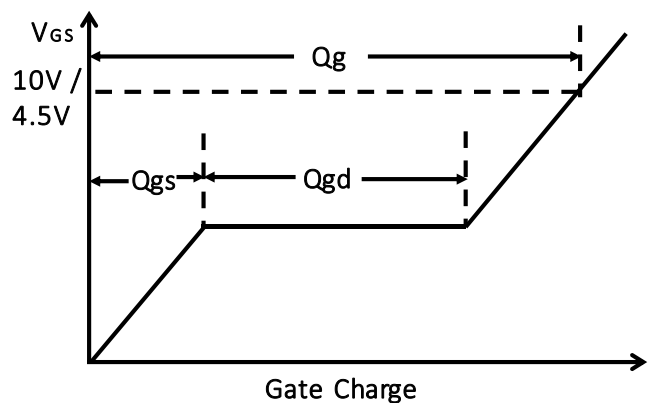
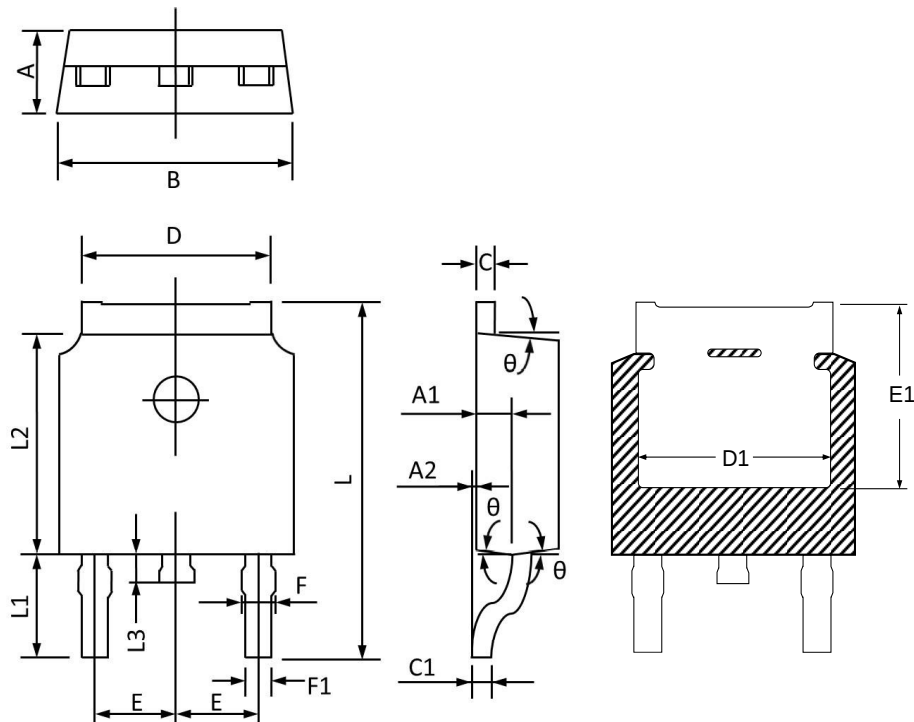


Fig.6 Turn-On Resistance vs. I_D

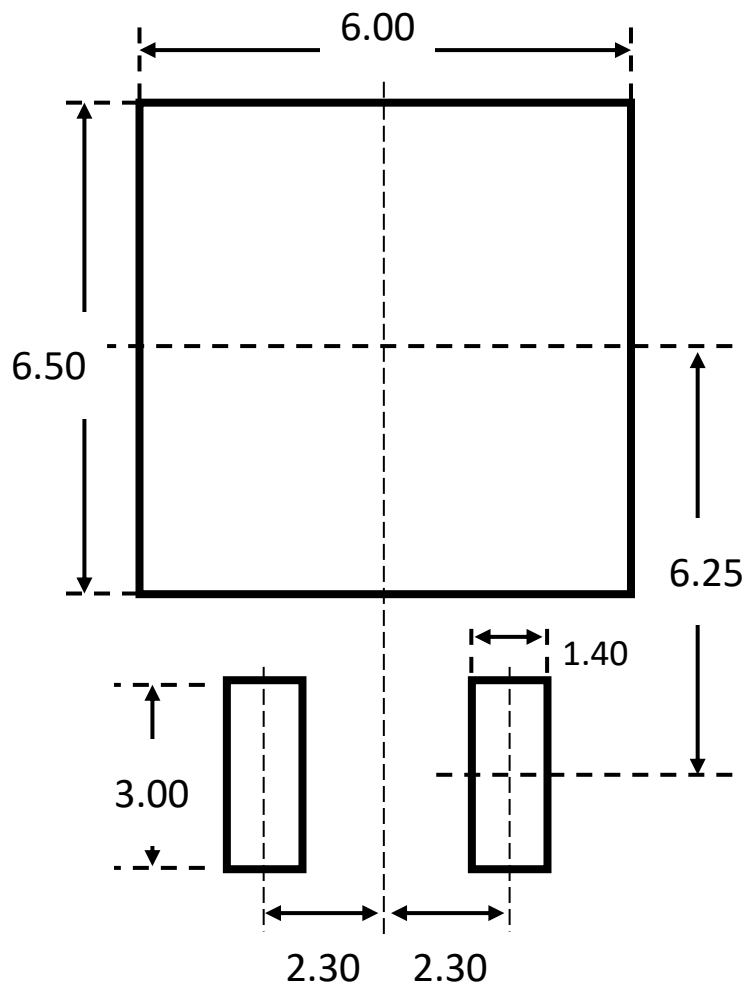

Fig.7 Capacitance Characteristics

Fig.8 Continuous Drain Current vs. T_c

Fig.9 Normalized Transient Impedance

Fig.10 Maximum Safe Operation Area

Fig.11 Switching Time Waveform

Fig.12 Gate Charge Waveform

TO252 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	2.450	2.150	0.096	0.085
A1	1.200	0.900	0.047	0.035
A2	0.250	0.000	0.010	0.000
B	6.800	6.300	0.268	0.248
C	0.600	0.350	0.024	0.014
C1	0.600	0.380	0.024	0.015
D	5.500	5.100	0.217	0.201
D1	5.400	4.950	0.212	0.195
E	2.400	2.000	0.094	0.079
E1	5.650	4.950	0.222	0.194
F	1.150	0.600	0.045	0.024
F1	0.900	0.500	0.035	0.020
L	10.400	9.400	0.409	0.370
L1	3.100	2.400	0.122	0.094
L2	6.300	5.300	0.248	0.209
L3	1.200	0.600	0.047	0.024
θ	9°	3°	9°	3°

TO252 RECOMMENDED LAND PATTERN



unit : mm