25V N-Channel MOSFETs

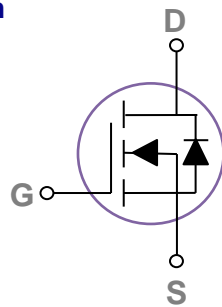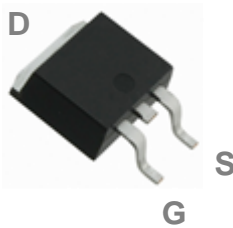# PDD2956C-5

General Description

These N-Channel enhancement mode power field effect transistors are using trench DMOS 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.

BVDSS	RDSON	ID
25V	5.3mΩ	65A

Features

- *25V,65A, RDS(ON) =5.3mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

- *Networking*
- *Load Switch*
- *Notebook*

TO252 Pin Configuration

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	25	V
V_{GS}	Gate-Source Voltage	±20V	V
I_D	Drain Current – Continuous (T_C=25℃)	65	A
	Drain Current – Continuous (T_C=100℃)	42	A
I_{DM}	Drain Current – Pulsed[1]	260	A
EAS	Single Pulse Avalanche Energy[2]	76	mJ
IAS	Single Pulse Avalanche Current[2]	39	A
P_D	Power Dissipation (T_C=25℃)	40	W
	Power Dissipation – Derate above 25℃	0.32	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	3.12	℃/W

Electrical Characteristics (T$_J$=25 ℃, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V , I$_D$=250uA	25	---	---	V
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=25V , V$_{GS}$=0V , T$_J$=25℃	---	---	1	uA
		V$_{DS}$=20V , V$_{GS}$=0V , T$_J$=125℃	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V , V$_{DS}$=0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V , I$_D$=15A	---	4.4	5.3	mΩ
		V$_{GS}$=4.5V , I$_D$=12A	---	6.2	8.1	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	1.2	1.6	2.5	V
gfs	Forward Transconductance	V$_{DS}$=10V , I$_D$=1A	---	8	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q$_g$	Total Gate Charge[3],[4]	V$_{DS}$=15V , V$_{GS}$=10V , I$_D$=30A	---	21	32	nC
Q$_{gs}$	Gate-Source Charge[3],[4]		---	2.6	4	
Q$_{gd}$	Gate-Drain Charge[3],[4]		---	6	9	
T$_{d(on)}$	Turn-On Delay Time[3],[4]	V$_{DD}$=15V , V$_{GS}$=10V , R$_G$=6Ω I$_D$=30A	---	4.6	7	ns
T$_r$	Rise Time[3],[4]		---	14	21	
T$_{d(off)}$	Turn-Off Delay Time[3],[4]		---	27.2	41	
T$_f$	Fall Time[3],[4]		---	7.8	12	
C$_{iss}$	Input Capacitance	V$_{DS}$=15V , V$_{GS}$=0V , F=1MHz	---	1180	1770	pF
C$_{oss}$	Output Capacitance		---	210	320	
C$_{rss}$	Reverse Transfer Capacitance		---	170	260	
R$_g$	Gate resistance	V$_{GS}$=0V, V$_{DS}$=0V, F=1MHz	---	4	---	Ω

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	---	---	65	A
I$_{SM}$	Pulsed Source Current		---	---	130	A
V$_{SD}$	Diode Forward Voltage	V$_{GS}$=0V , I$_S$=1A , T$_J$=25℃	---	---	1	V
t$_{rr}$	Reverse Recovery Time	V$_{GS}$=0V, I$_S$=10A	---	610	---	ns
Q$_{rr}$	Reverse Recovery Charge	di/dt=100A/µs, T$_J$=25℃	---	2	---	uC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=39A.,R$_G$=25Ω,Starting T$_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
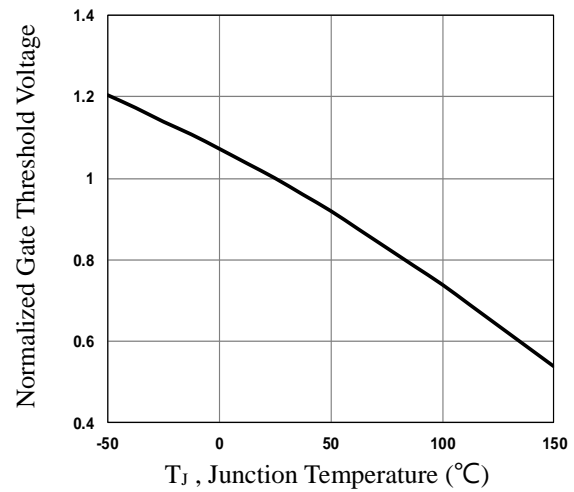4. Essentially independent of operating temperature.
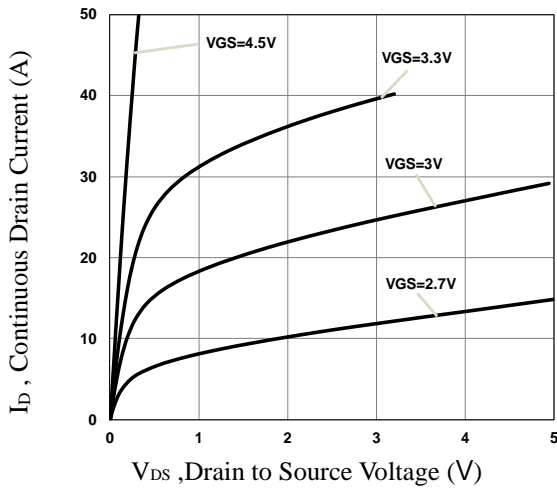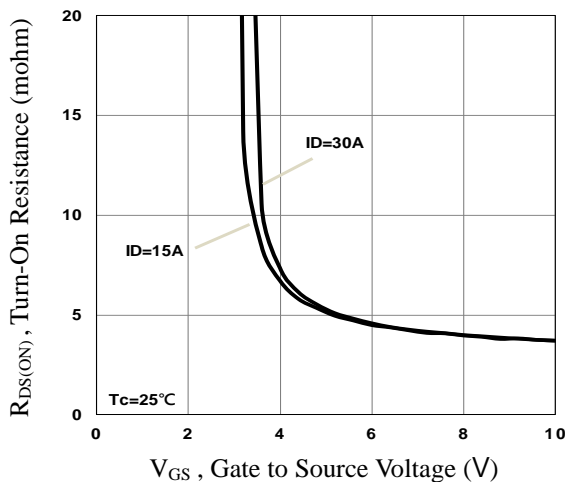
Fig.1   Typical Output Characteristics
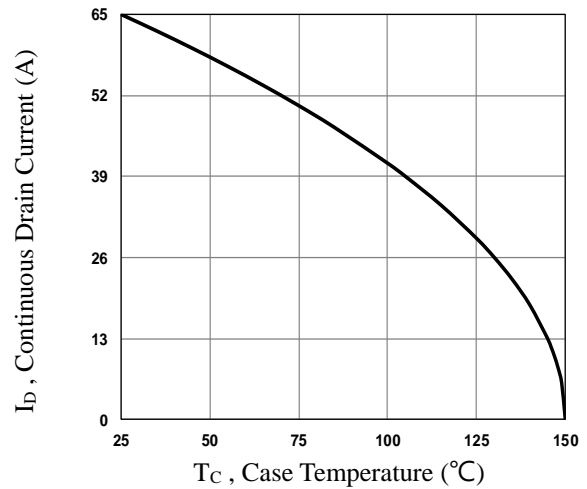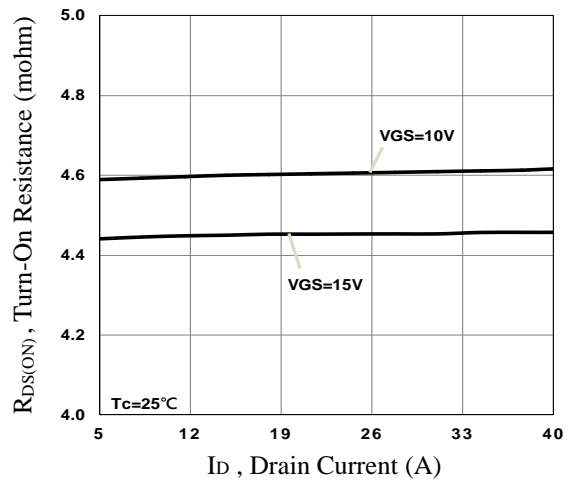

Fig.2   Continuous Drain Current vs. T_C
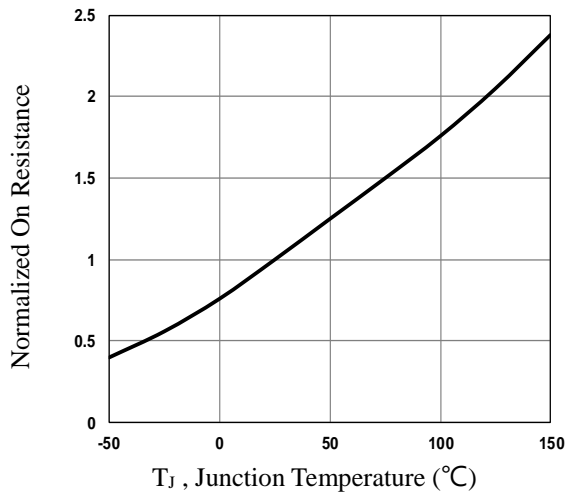
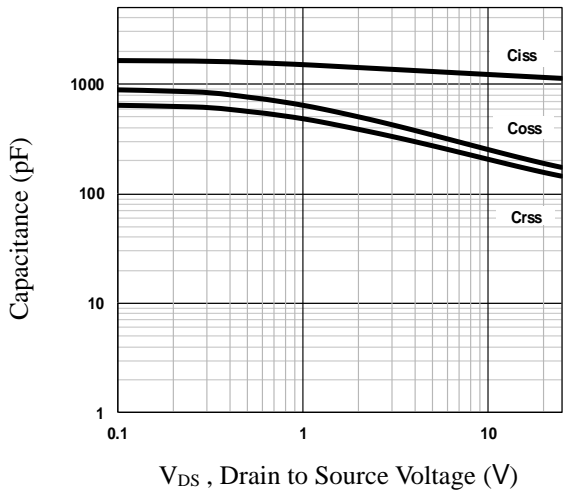Fig.3   Normalized RDSON vs. T_J

Fig.4   Normalized V_{th} vs. T_J

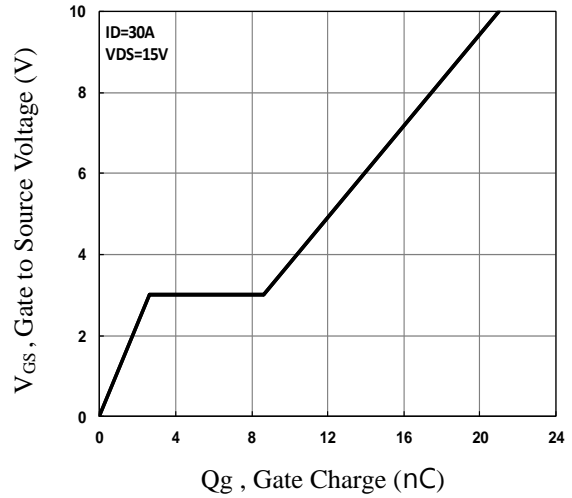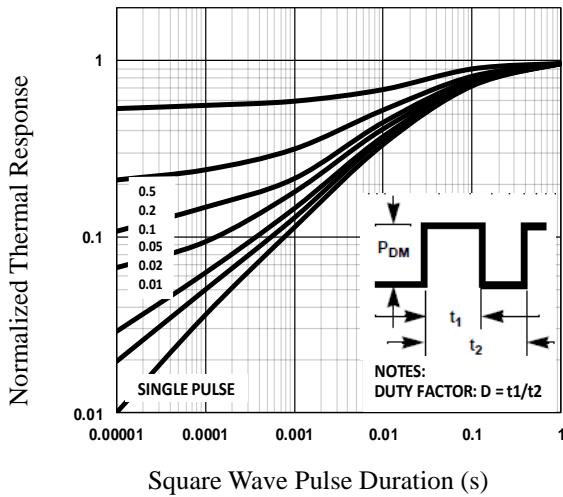

Fig.5   Turn-On Resistance vs. V_{GS}

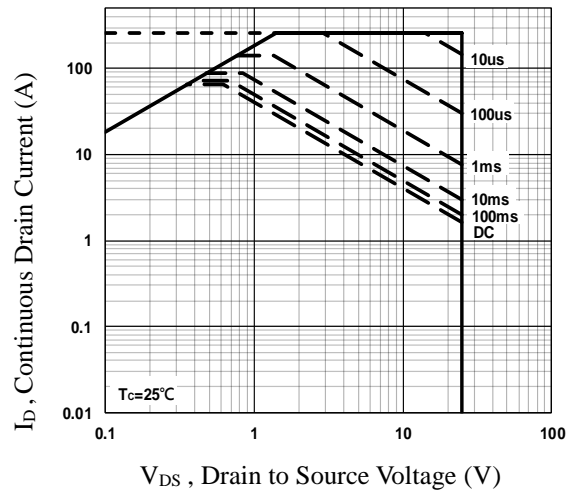
Fig.6   Turn-On Resistance vs. I_D

Fig.7   Capacitance Characteristics
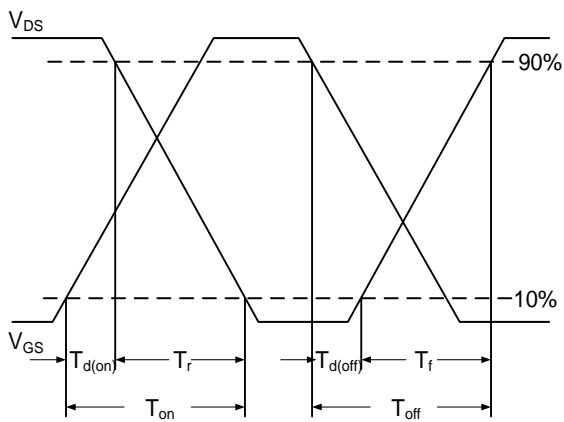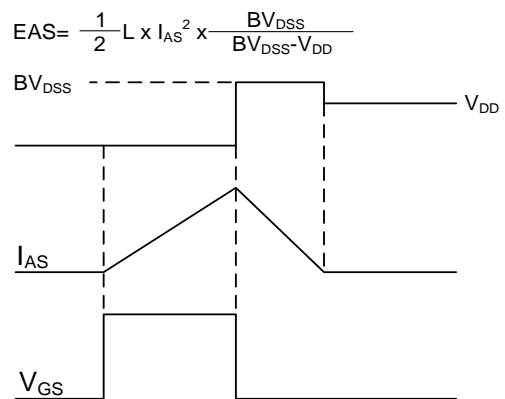

Fig.8   Gate Charge Characteristics

Fig.9   Normalized Transient Impedance

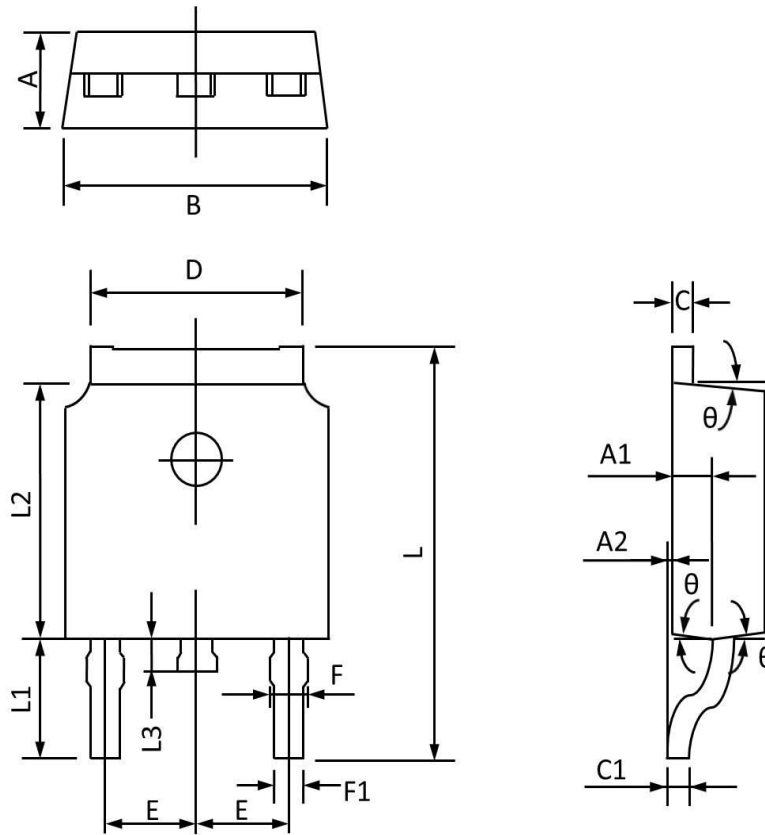**Fig.10   Maximum Safe Operation Area**

Fig.11   Switching Time Waveform

$$EAS = \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

Fig.12   EAS 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	0.910	0.047	0.036
A2	0.150	0.000	0.006	0.000
B	6.800	6.300	0.268	0.248
C	0.580	0.350	0.023	0.014
C1	0.550	0.380	0.022	0.015
D	5.500	5.100	0.217	0.201
E	2.390	2.000	0.094	0.079
F	0.940	0.600	0.037	0.024
F1	0.860	0.500	0.034	0.020
L	10.400	9.400	0.409	0.370
L1	3.000	2.400	0.118	0.094
L2	6.200	5.300	0.244	0.209
L3	1.200	0.600	0.047	0.024
θ	9°	3°	9°	3°