

General Description

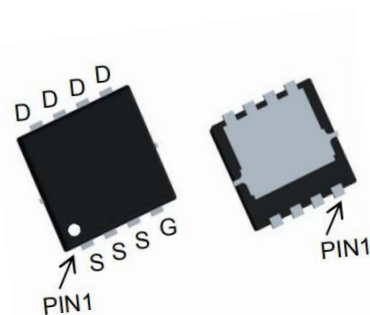
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

Features

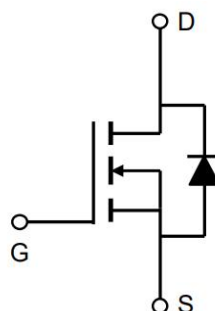
- ◆ 40V, 40A, $R_{DS(ON)}=7.5m\Omega@V_{GS} = 10V$
- ◆ Improved dv/dt capability
- ◆ Fast switching
- ◆ Green Device Available

Applications

- ◆ Notebook
- ◆ Load Switch
- ◆ LED applications
- ◆ Hand Held Device



PDFN3X3



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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	40	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	40	A
	Drain Current – Continuous ($T_c=100^\circ\text{C}$)	22.1	A
I_{DM}	Drain Current – Pulsed ¹	140	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	44	W
	Power Dissipation – Derate above 25°C	0.36	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	---	2.8	$^\circ\text{C/W}$

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	$V_{GS}=0V$, $I_D=250\mu A$	40	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1mA$	---	0.03	---	V/ $^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=40V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=32V$, $V_{GS}=0V$, $T_J=85^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V$, $V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V$, $I_D=8A$	---	7.5	9	m Ω
		$V_{GS}=4.5V$, $I_D=4A$	---	9.5	13.5	m Ω
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.0	1.4	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	mV/ $^\circ\text{C}$
g_{fs}	Forward Transconductance	$V_{DS}=10V$, $I_D=2A$	---	13	---	S

Dynamic and switching Characteristics

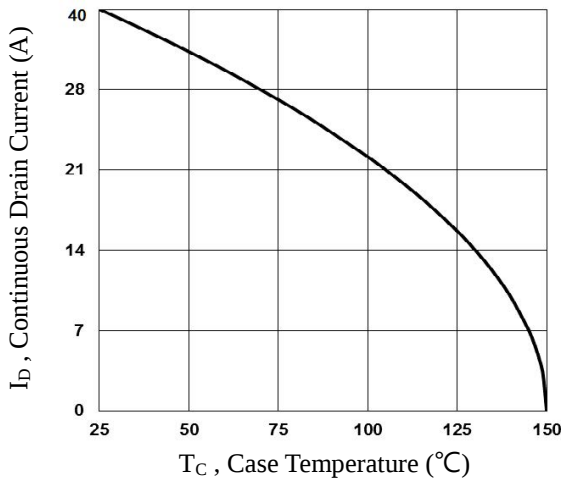
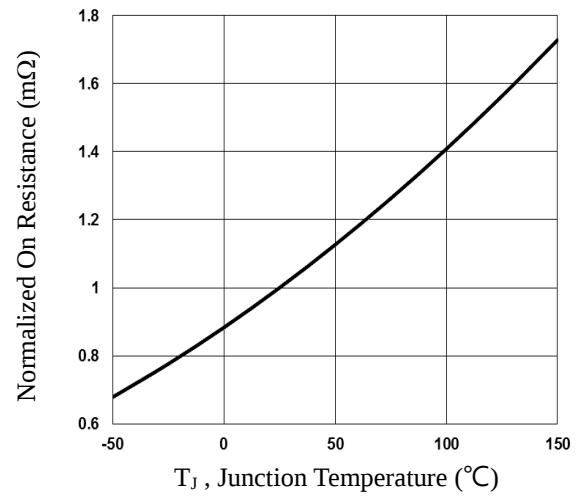
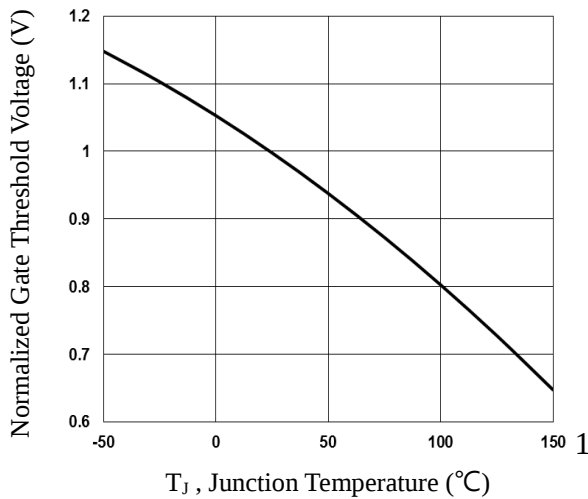
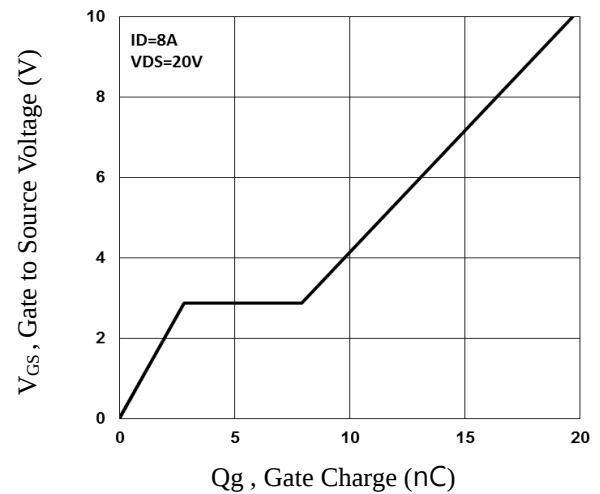
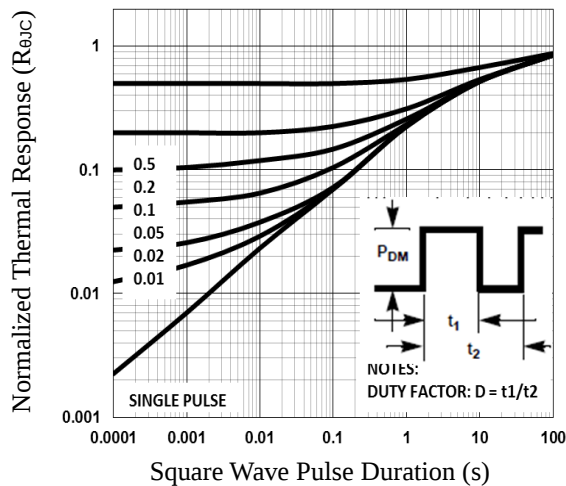
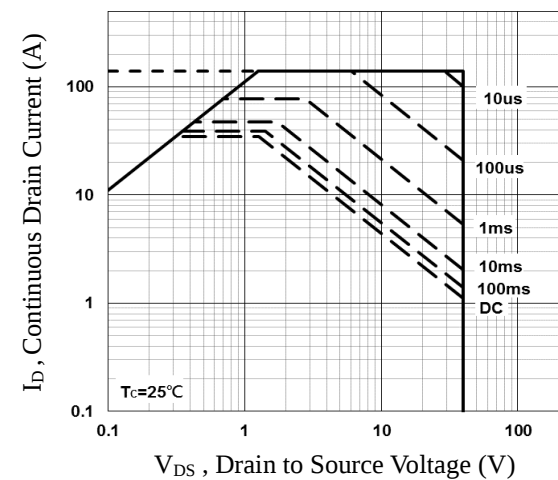
Q_g	Total Gate Charge ^{2, 3}	$V_{DS}=20V$, $V_{GS}=10V$, $I_D=8A$	---	19.7	---	nC
Q_{gs}	Gate-Source Charge ^{2, 3}		---	2.8	---	
Q_{gd}	Gate-Drain Charge ^{2, 3}		---	5.1	---	
$T_{d(on)}$	Turn-On Delay Time ^{2, 3}	$V_{DD}=15V$, $V_{GS}=10V$, $R_G=3.3\Omega$ $I_D=1A$	---	13.2	---	ns
T_r	Rise Time ^{2, 3}		---	2.2	---	
$T_{d(off)}$	Turn-Off Delay Time ^{2, 3}		---	72	---	
T_f	Fall Time ^{2, 3}		---	4.5	---	
C_{iss}	Input Capacitance	$V_{DS}=25V$, $V_{GS}=0V$, $F=1MHz$	---	1220	---	pF
C_{oss}	Output Capacitance		---	130	---	
C_{rss}	Reverse Transfer Capacitance		---	55	---	
R_g	Gate resistance	$V_{GS}=0V$, $V_{DS}=0V$, $F=1MHz$	---	2.2	---	Ω

Drain-Source Diode Characteristics and Maximum Ratings

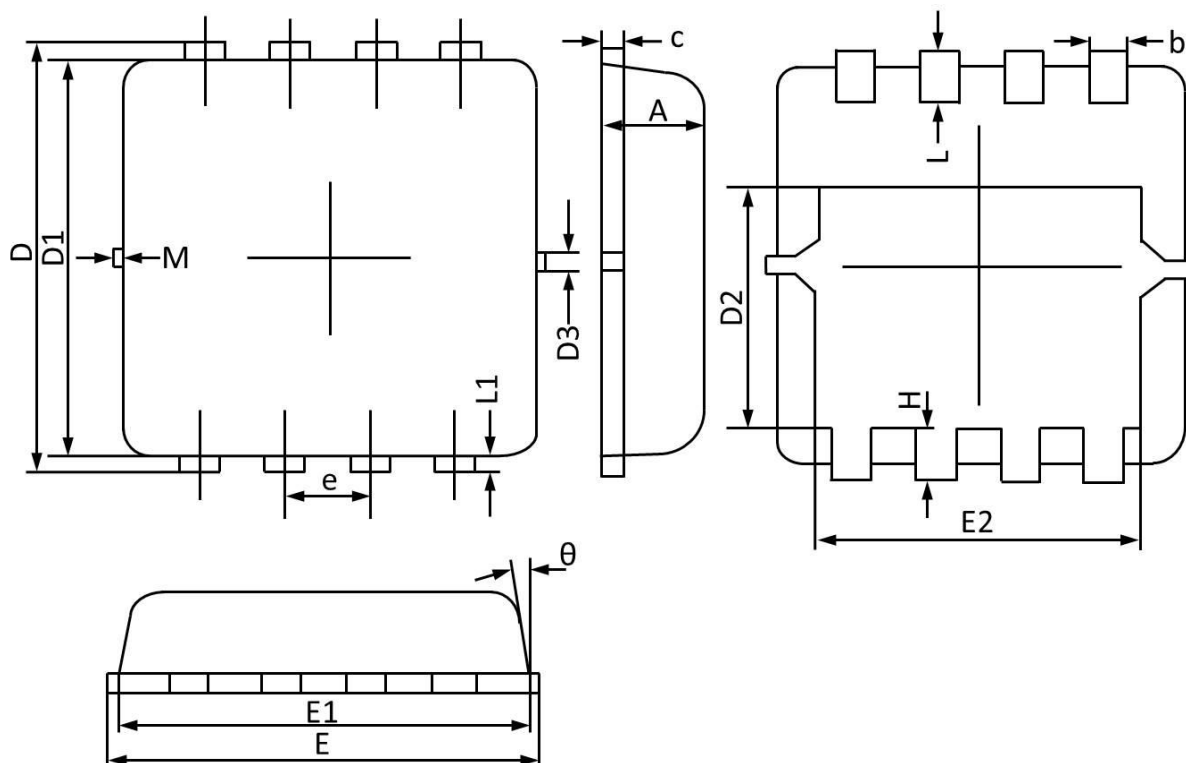
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	40	A
I_{SM}	Pulsed Source Current		---	---	80	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ\text{C}$	---	---	1.2	V
t_{rr}	Reverse Recovery Time ³	$V_{GS}=0V$, $I_S=1A$, $dI/dt=100A/\mu s$	---	17	---	ns
Q_{rr}	Reverse Recovery Charge ³	$T_J=25^\circ\text{C}$	---	2.8	---	nC

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 Continuous Drain Current vs. T_C

Fig.2 Normalized $R_{DS(on)}$ vs. T_J

Fig.3 Normalized V_{th} vs. T_J

Fig.4 Gate Charge Waveform

Fig.5 Normalized Transient Impedance

Fig.6 Maximum Safe Operation Area

PDFN3x3 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	