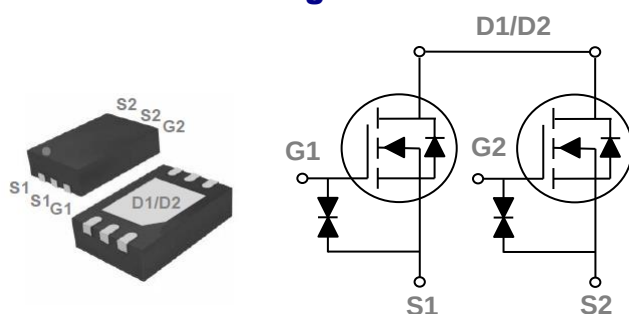


General Description

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.

DFN2x3 Dual Pin Configuration



BVDSS	RDS(ON)	ID
20V	8.2mΩ	11A

Features

- 20V, 11A, $R_{DS(ON)} = 8.2m\Omega$ @ $V_{GS} = 4.5V$
- Improved dv/dt capability
- Fast switching
- G-S ESD Protection Diode Embedded
- Green Device Available

Applications

- Handheld Instruments
- POL Applications
- Battery Protection Applications

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

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Drain Current – Continuous ($T_c=25^\circ\text{C}$)	11	A
	Drain Current – Continuous ($T_c=70^\circ\text{C}$)	8.8	A
I_{DM}	Drain Current – Pulsed ¹	70	A
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	1.56	W
	Power Dissipation – Derate above 25°C	0.0125	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	---	80	$^\circ\text{C/W}$

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	$V_{GS}=0V$, $I_D=250\mu A$	20	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=18V$, $V_{GS}=0V$, $T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=16V$, $V_{GS}=0V$, $T_J=70^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V$, $V_{DS}=0V$	---	---	± 10	μA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance ³	$V_{GS}=4.5V$, $I_D=5.5A$	4.5	6	8.2	$m\Omega$
		$V_{GS}=4V$, $I_D=5.5A$	4.7	6.2	8.5	$m\Omega$
		$V_{GS}=3.7V$, $I_D=5.5A$	5	6.5	9	$m\Omega$
		$V_{GS}=3.1V$, $I_D=5.5A$	5.5	7	9.4	$m\Omega$
		$V_{GS}=2.5V$, $I_D=5.5A$	6	8.2	11	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	0.5	0.72	1.5	V
g_{fs}	Forward Transconductance	$V_{DS}=5V$, $I_D=5.5A$	---	20	---	S

Dynamic and switching Characteristics

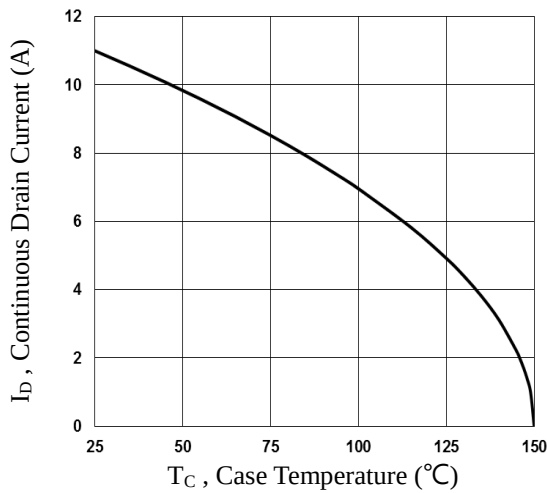
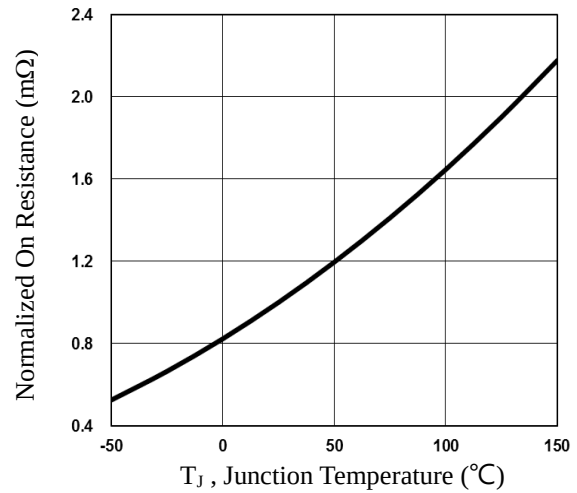
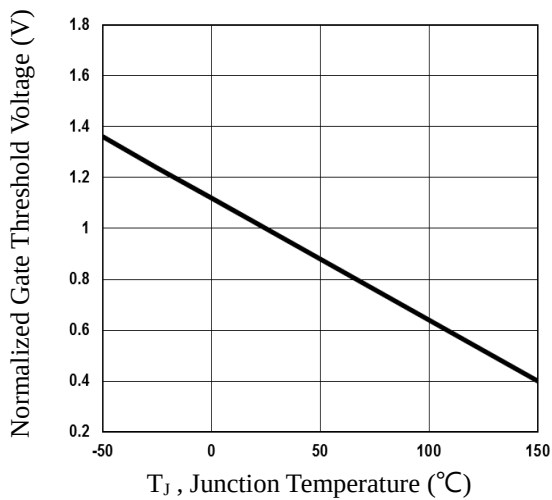
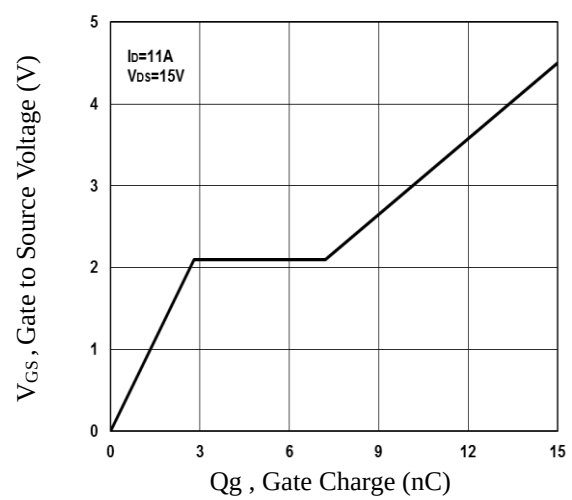
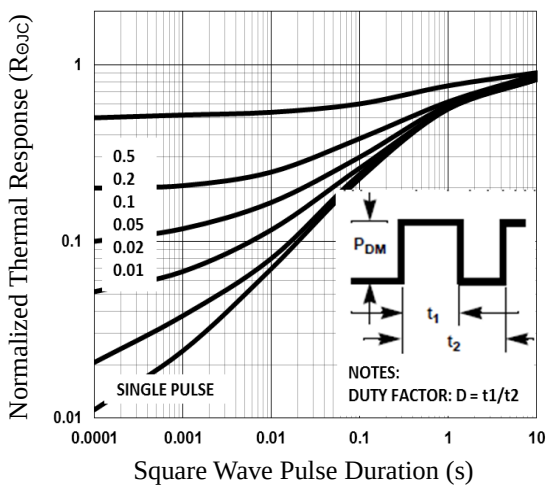
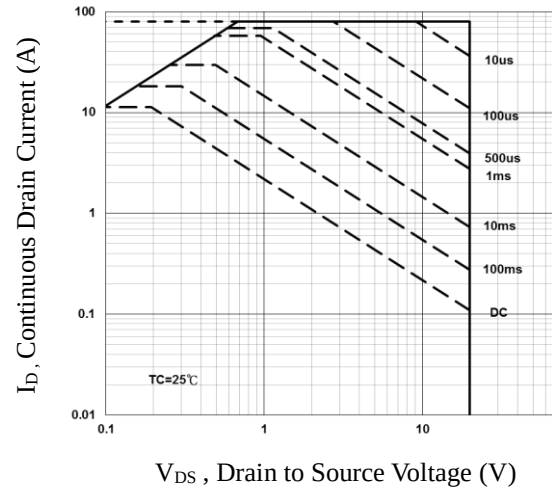
Q_g	Total Gate Charge ^{2,3}	$V_{DS}=15V$, $V_{GS}=4.5V$, $I_D=11A$	---	15	30	nC
Q_{gs}	Gate-Source Charge ^{2,3}		---	2.8	5.6	
Q_{gd}	Gate-Drain Charge ^{2,3}		---	4.4	8.8	
$T_{d(on)}$	Turn-On Delay Time ^{2,3}	$V_{DD}=15V$, $V_{GS}=10V$, $R_G=6\Omega$ $I_D=5.5A$	---	28	56	ns
T_r	Rise Time ^{2,3}		---	64	128	
$T_{d(off)}$	Turn-Off Delay Time ^{2,3}		---	60	120	
T_f	Fall Time ^{2,3}		---	55	110	
C_{iss}	Input Capacitance	$V_{DS}=10V$, $V_{GS}=0V$, $F=1MHz$	---	1350	2500	pF
C_{oss}	Output Capacitance		---	185	350	
C_{rss}	Reverse Transfer Capacitance		---	160	300	

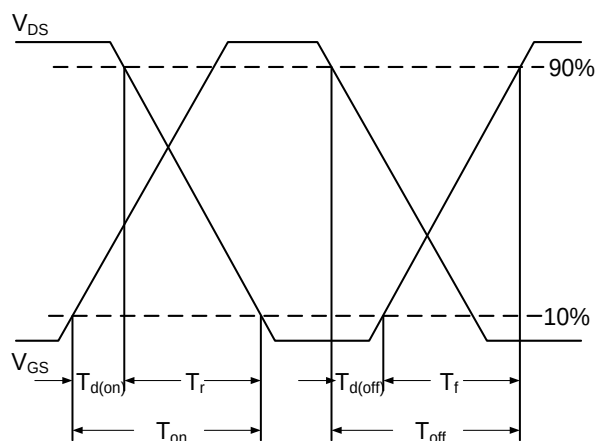
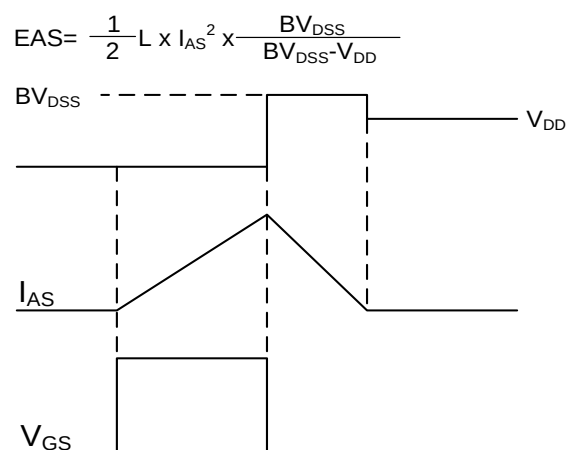
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	11	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=1A$, $T_J=25^\circ\text{C}$	---	---	1	V

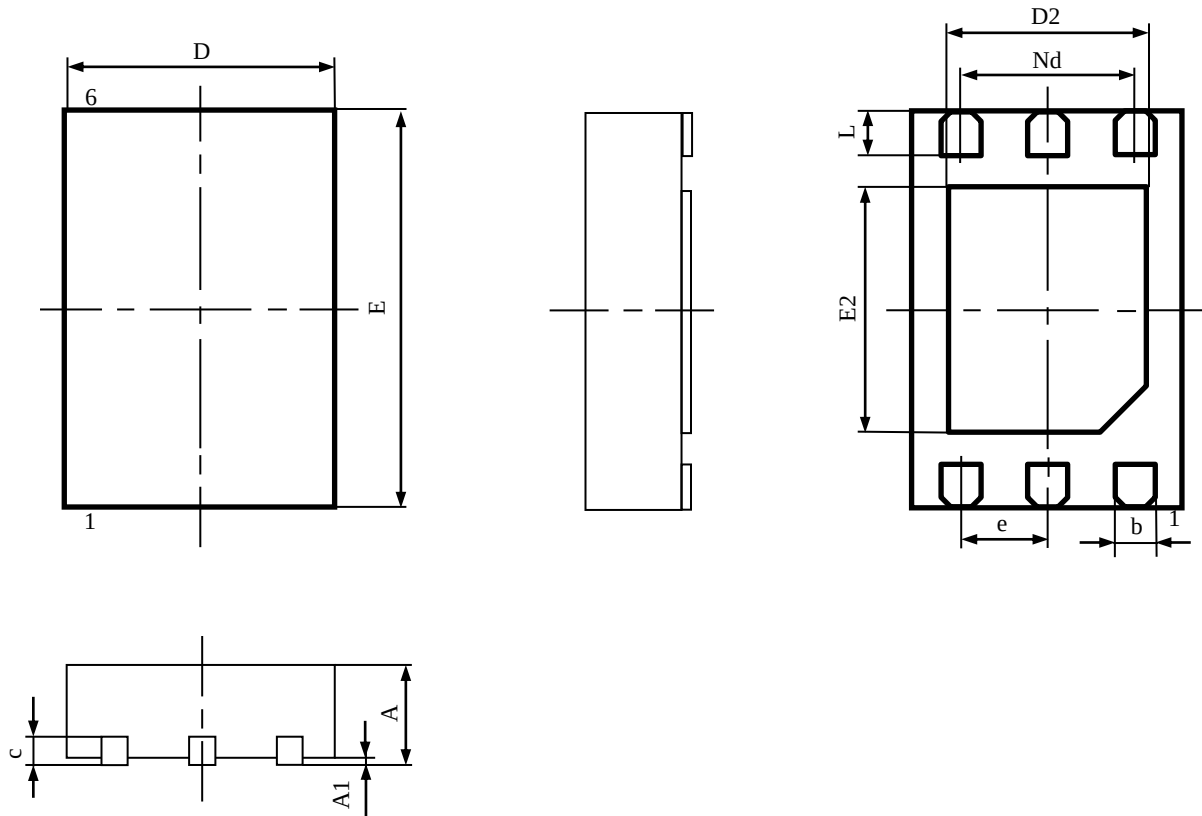
Note :

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 Response

Fig.6 Maximum Safe Operation Area

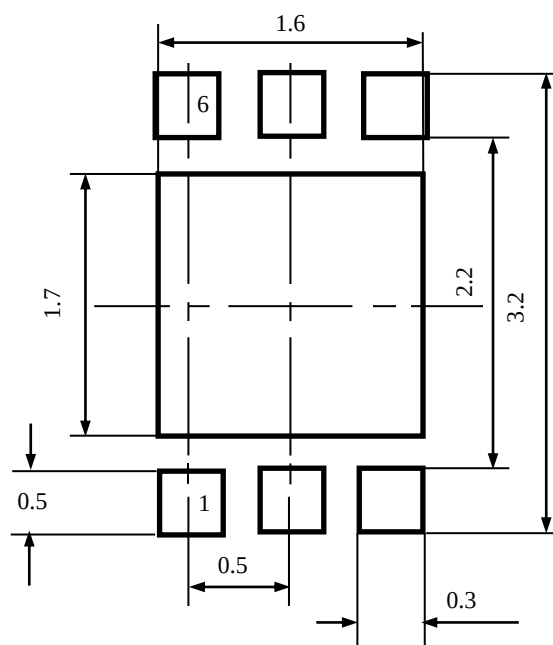

Fig.7 Switching Time Waveform

Fig.8 EAS Waveform

DFN2X3 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.800	0.700	0.031	0.028
A1	0.050	0.02typ.	0.002	0.001typ.
b	0.350	0.200	0.014	0.008
c	0.250	0.180	0.010	0.007
D	2.100	1.900	0.083	0.075
D2	1.600	1.400	0.063	0.055
e	0.5BSC		0.02BSC	
Nd	1.0BSC		0.04BSC	
E	3.100	2.900	0.122	0.114
E2	1.750	1.650	0.069	0.065
L	0.400	0.300	0.016	0.012

DFN2X3 RECOMMENDED LAND PATTERN



unit : mm