

General Description

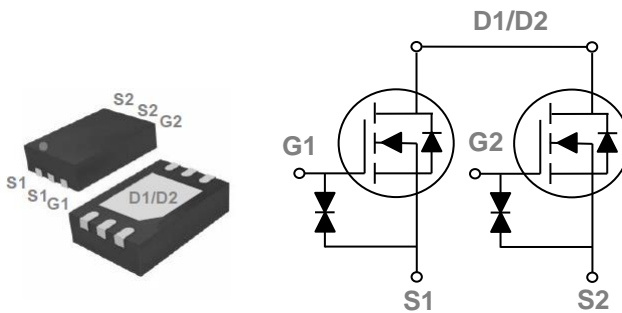
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
20V	9.6mΩ	24A

Features

- 20V,24A, $R_{DS(ON)} = 9.6m\Omega$ @ $V_{GS} = 4.5V$
- Improved dv/dt capability
- Fast switching
- G-S ESD Protection Diode Embedded
- Green Device Available

DFN2x3 Dual Pin Configuration



Applications

- Handheld Instruments
- POL Applications
- Battery Protection Applications

Absolute Maximum Ratings $T_c=25^\circ C$ 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 ($T_A=25^\circ C$)	24	A
	Drain Current – Continuous ($T_A=70^\circ C$)	19.2	A
I_{DM}	Drain Current – Pulsed ¹	120	A
P_D	Power Dissipation ($T_c=25^\circ C$)	13.6	W
	Power Dissipation – Derate above $25^\circ C$	0.109	W/ $^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction to case	---	9.2	$^\circ C/W$

Electrical Characteristics (T_J=25 °C, unless otherwise noted)
Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	20	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =16V, V _{GS} =0V, T _J =85°C	---	---	10	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±20	uA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance ³	V _{GS} =4.5V, I _D =2.4A	6.8	8	9.6	mΩ
		V _{GS} =4.0V, I _D =2.4A	7.1	8.4	10	mΩ
		V _{GS} =3.7V, I _D =2.4A	7.4	8.6	10.8	mΩ
		V _{GS} =3.1V, I _D =2.4A	8.1	9.3	12.1	mΩ
		V _{GS} =2.5V, I _D =2.4A	9	10.5	13.6	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	0.5	0.65	1.5	V
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =5A	---	15	---	S

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2,3}	V _{DS} =20V, V _{GS} =4.5V, I _D =5A	---	13.8	---	nC
Q _{gs}	Gate-Source Charge ^{2,3}		---	2.1	---	
Q _{gd}	Gate-Drain Charge ^{2,3}		---	4.5	---	
T _{d(on)}	Turn-On Delay Time ^{2,3}	V _{DD} =15V, V _{GS} =10V, R _G =6Ω I _D =5A	---	28	---	ns
T _r	Rise Time ^{2,3}		---	64	---	
T _{d(off)}	Turn-Off Delay Time ^{2,3}		---	60	---	
T _f	Fall Time ^{2,3}		---	55	---	
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, F=1MHz	---	1514	---	pF
C _{oss}	Output Capacitance		---	178	---	
C _{rss}	Reverse Transfer Capacitance		---	145	---	

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	---	---	24	A
I _{SM}	Pulsed Source Current		---	---	48	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1	V

Note :

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

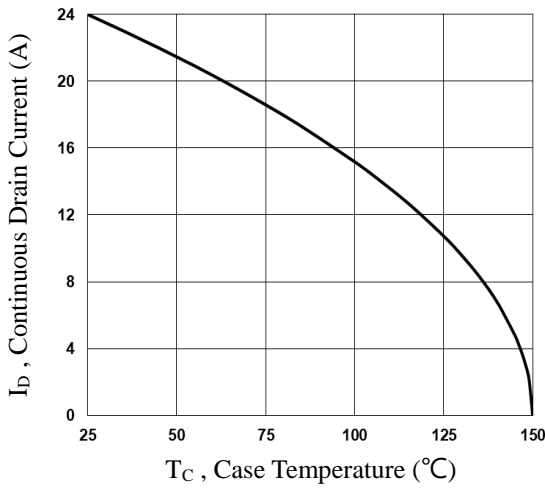


Fig.1 Continuous Drain Current vs. T_c

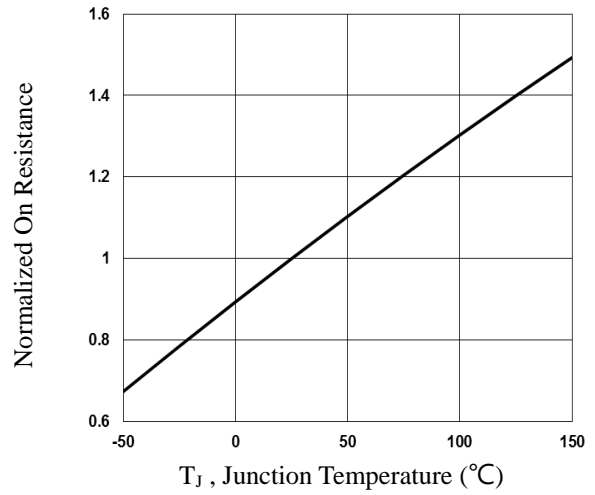


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

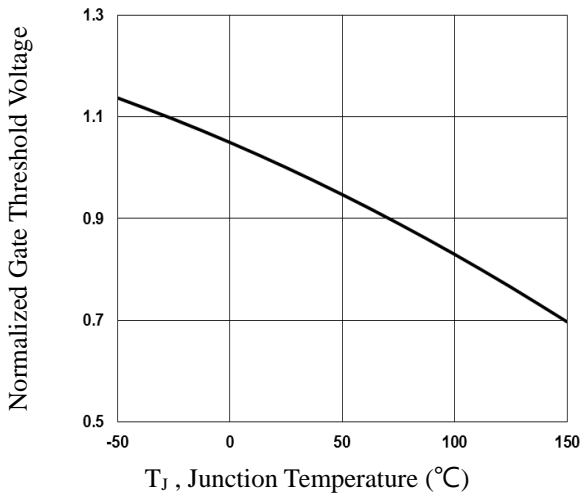


Fig.3 Normalized V_{th} vs. T_j

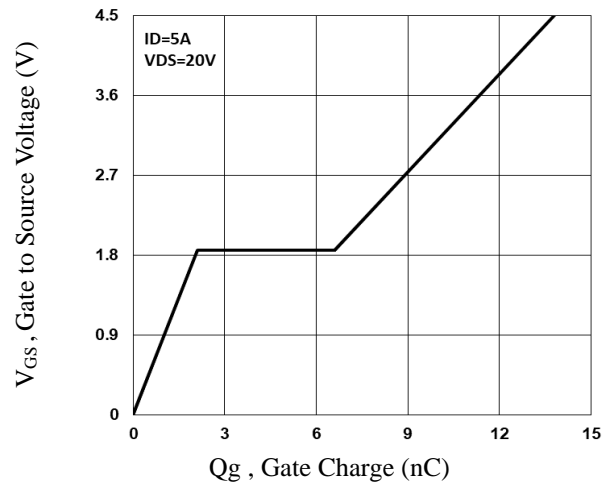


Fig.4 Gate Charge Waveform

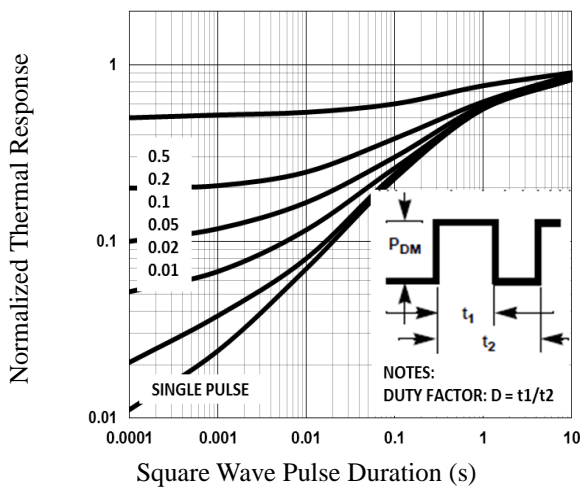


Fig.5 Normalized Transient Response

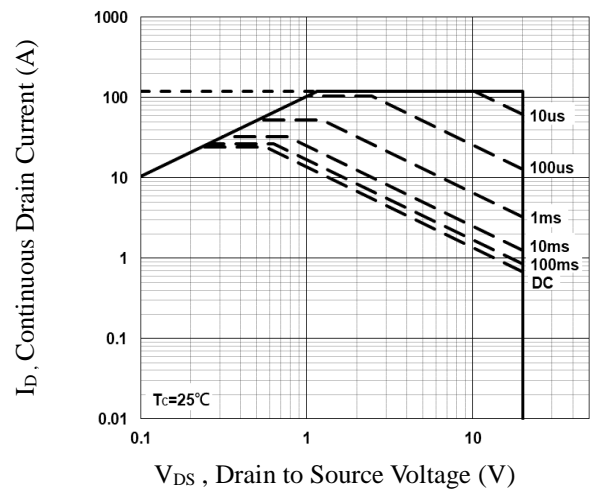


Fig.6 Maximum Safe Operation Area

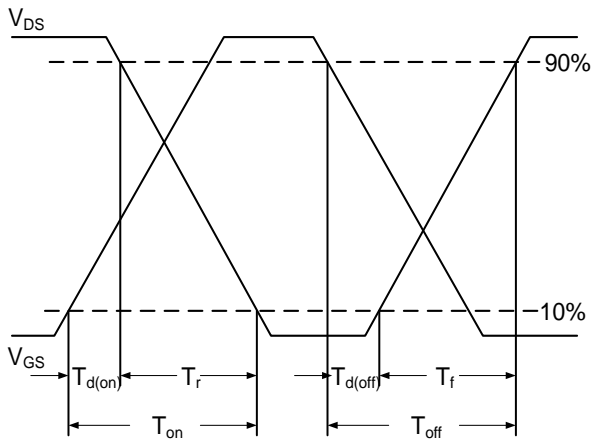


Fig.7 Switching Time Waveform

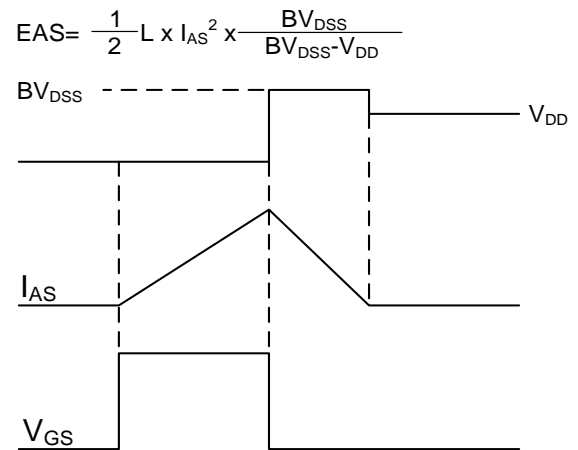
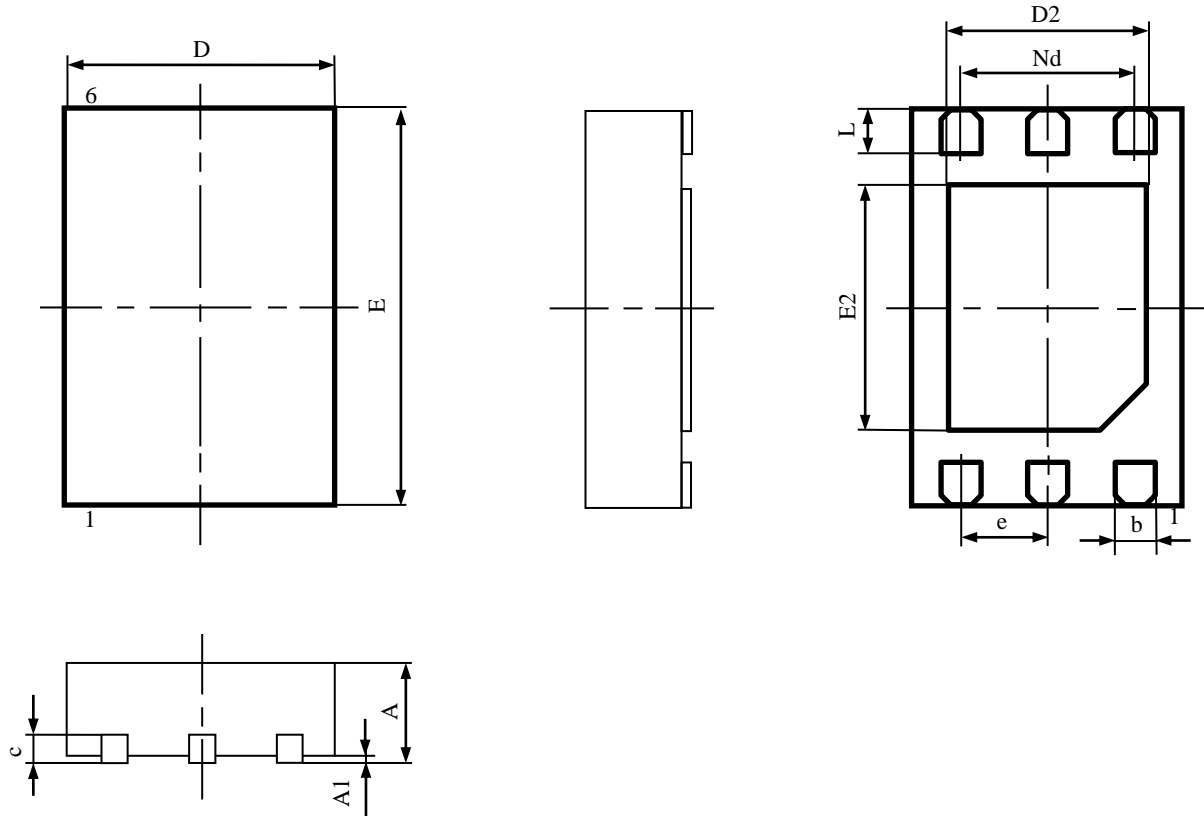


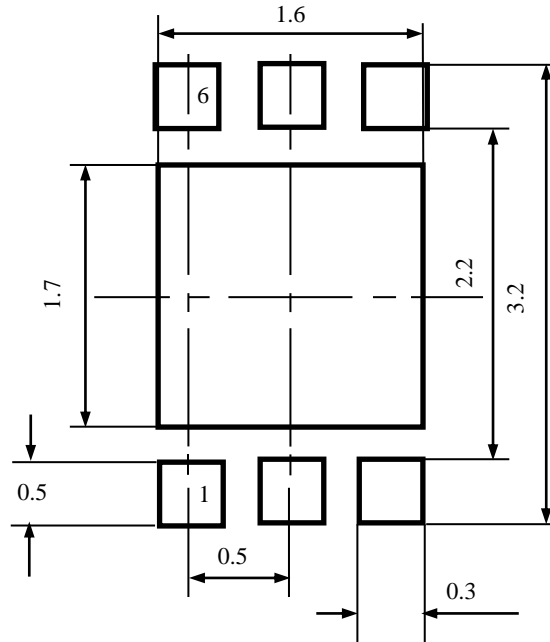
Fig.8 EAS Waveform

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