

General Description

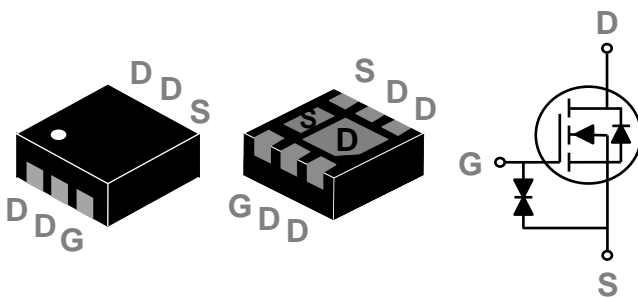
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These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

BVDSS	RDSON	ID
20V	13mΩ	9.9A

Features

- 20V,9.9A, $R_{DS(ON)} = 13m\Omega$ @ $V_{GS} = 4.5V$
- Improved dv/dt capability
- ESD Protection Diode Embedded
- Green Device Available

DFN2X2-6L Pin Configuration



Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR
- Li-Battery Protection

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	± 10	V
I_D	Drain Current – Continuous ($T_A=25^\circ\text{C}$)	9.9	A
	Drain Current – Continuous ($T_A=70^\circ\text{C}$)	7.9	A
I_{DM}	Drain Current – Pulsed ¹ (Chip Limitation)	39.6	A
P_D	Power Dissipation ($T_A=25^\circ\text{C}$)	2.01	W
	Power Dissipation – Derate above 25°C	0.016	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	$^\circ\text{C/W}$

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 =250μA	20	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.02	---	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1	μA
		V _{DS} =16V, V _{GS} =0V, T _J =125°C	---	---	10	μA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±10V, V _{DS} =0V	---	---	±10	μA

On Characteristics

R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =4.5V, I _D =5A	---	10	13	mΩ
		V _{GS} =2.5V, I _D =3A	---	11.5	15.5	mΩ
		V _{GS} =1.8V, I _D =2A	---	15	21	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250μA	0.3	0.6	1	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-2	---	mV/°C

Dynamic and switching Characteristics

Q _g	Total Gate Charge ^{2, 3}	V _{DS} =10V, V _{GS} =4.5V, I _D =5A	---	16.9	26	nC
Q _{gs}	Gate-Source Charge ^{2, 3}		---	1.1	3	
Q _{gd}	Gate-Drain Charge ^{2, 3}		---	4	7	
T _{d(on)}	Turn-On Delay Time ^{2, 3}	V _{DD} =10V, V _{GS} =4.5V, R _G =25Ω I _D =1A	---	6.8	13	ns
T _r	Rise Time ^{2, 3}		---	20	38	
T _{d(off)}	Turn-Off Delay Time ^{2, 3}		---	41.8	79	
T _f	Fall Time ^{2, 3}		---	13.2	25	
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, F=1MHz	---	1020	1480	pF
C _{oss}	Output Capacitance		---	160	240	
C _{rss}	Reverse Transfer Capacitance		---	110	160	
R _g	Gate resistance		V _{GS} =0V, V _{DS} =0V, F=1MHz	---	2	

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	---	---	9.9	A
I _{SM}	Pulsed Source Current		---	---	19.8	A
V _{SD}	Diode Forward Voltage	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 ≤ 300μs, duty cycle ≤ 2%.
3. Essentially independent of operating temperature.

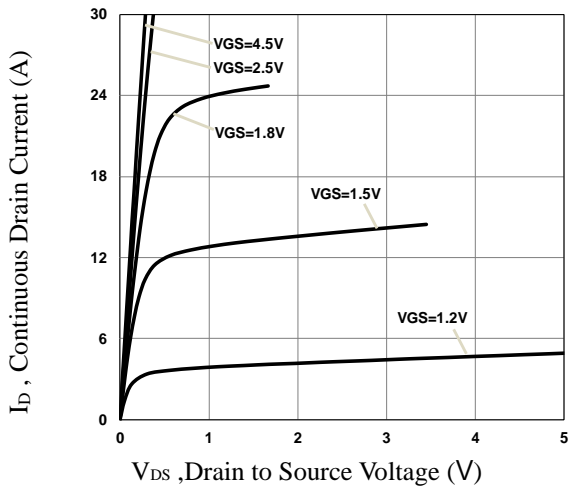


Fig.1 Typical Output Characteristics

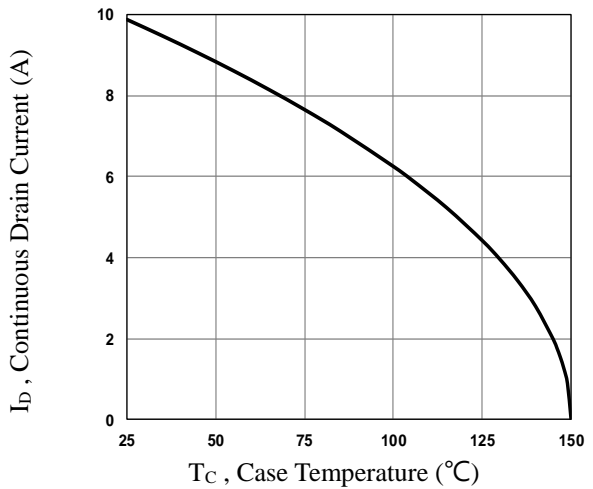


Fig.2 Continuous Drain Current vs. T_c

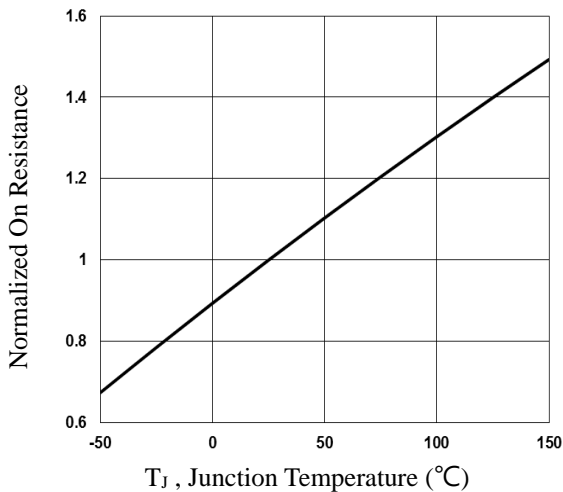


Fig.3 Normalized R_{DS(on)} vs. T_j

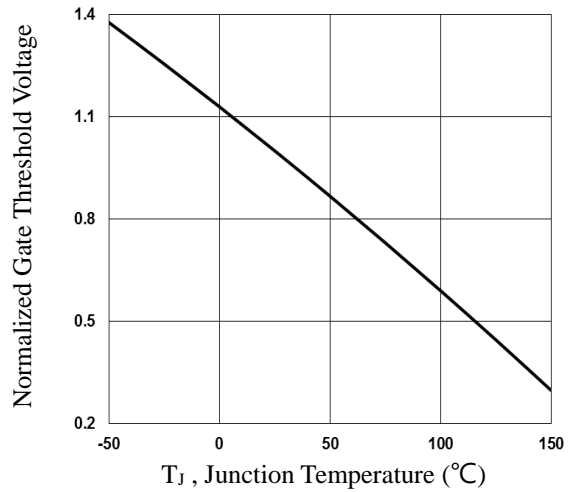


Fig.4 Normalized V_{th} vs. T_j

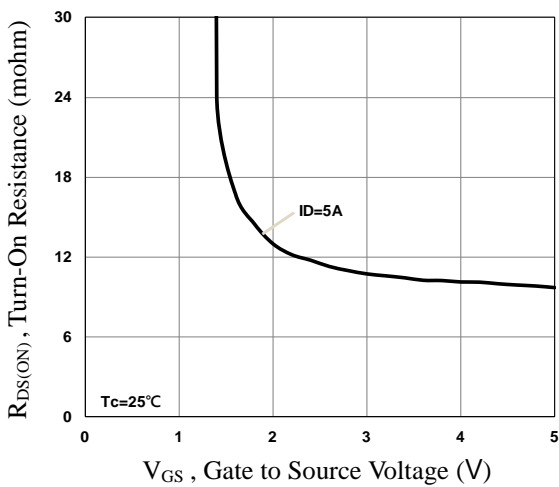


Fig.5 Turn-On Resistance vs. V_{GS}

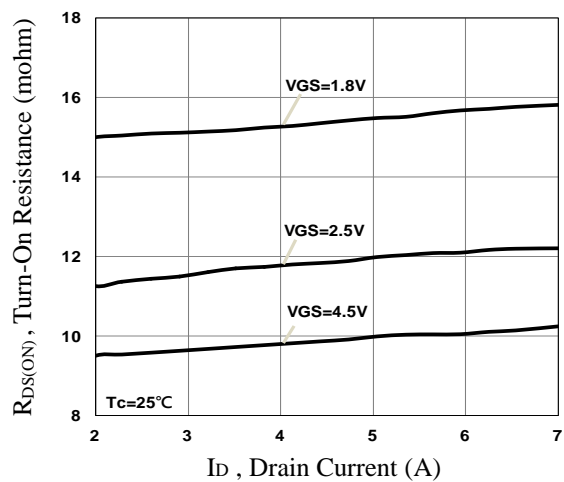


Fig.6 Turn-On Resistance vs. I_D

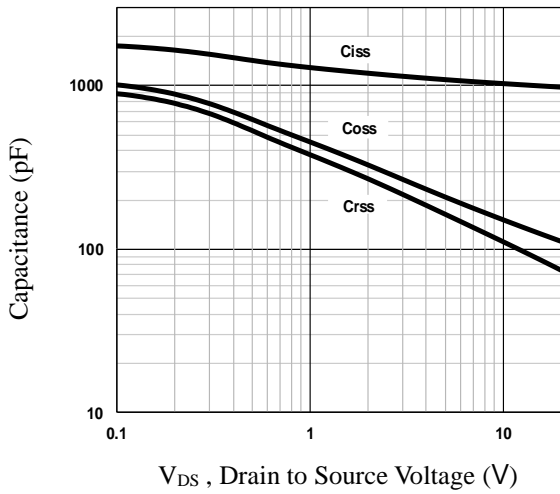


Fig.7 Capacitance Characteristics

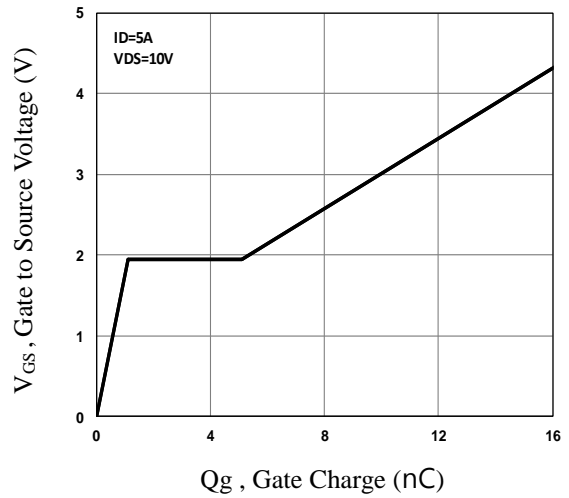


Fig.8 Gate Charge Characteristics

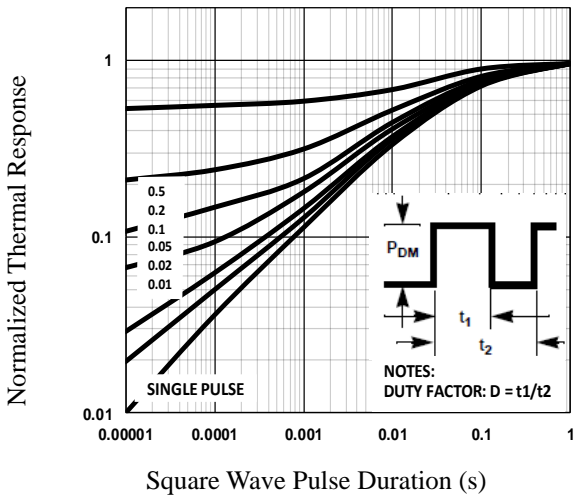


Fig.9 Normalized Transient Impedance

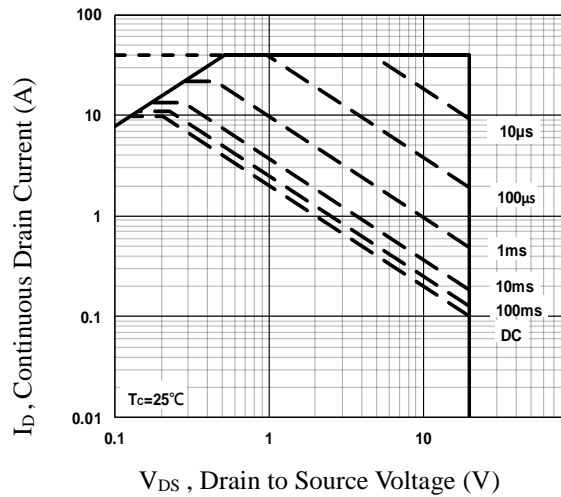


Fig.10 Maximum Safe Operation Area

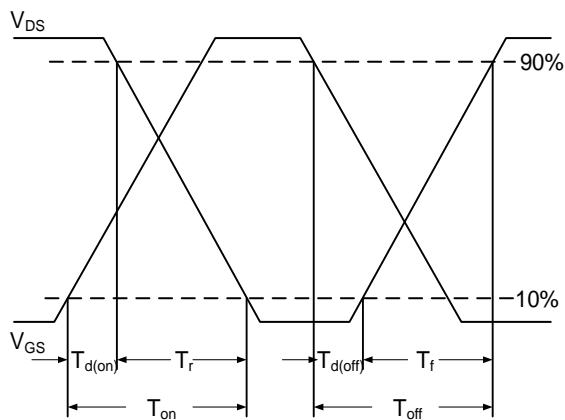


Fig.11 Switching Time Waveform

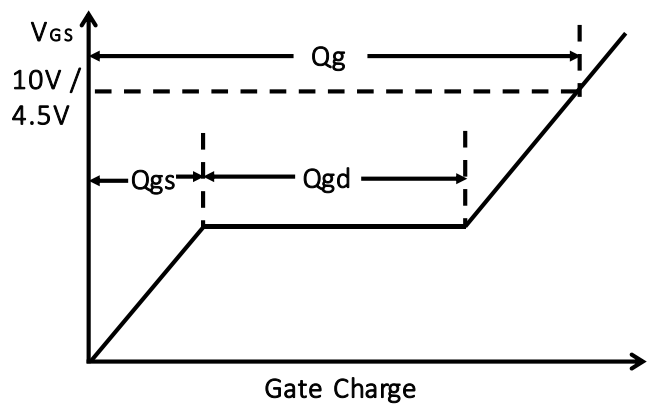
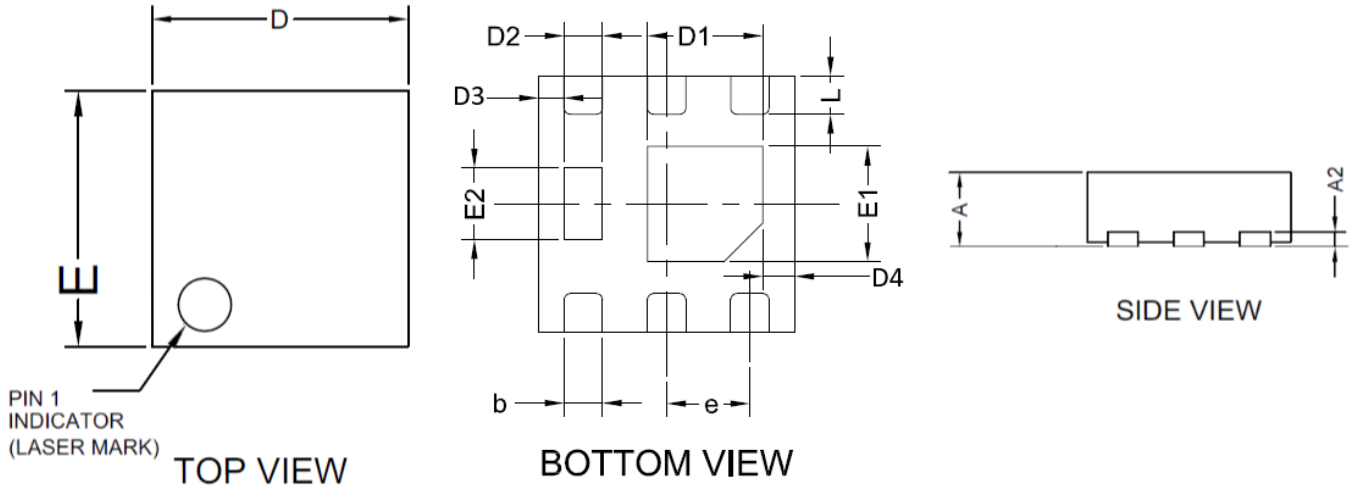


Fig.12 Gate Charge Waveform

DFN2X2-6L PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.800	0.500	0.031	0.019
A2	0.250	0.145	0.010	0.006
b	0.350	0.250	0.014	0.010
D	2.100	1.900	0.083	0.075
D1	1.050	0.800	0.041	0.031
D2	0.430	0.250	0.017	0.010
D3	0.200BSC		0.008BSC	
D4	0.200BSC		0.008BSC	
E	2.100	1.900	0.083	0.075
E1	1.250	0.800	0.049	0.031
E2	0.750	0.460	0.029	0.018
e	0.650BSC		0.026BSC	
L	0.350	0.225	0.014	0.009

