XR2221

General Description

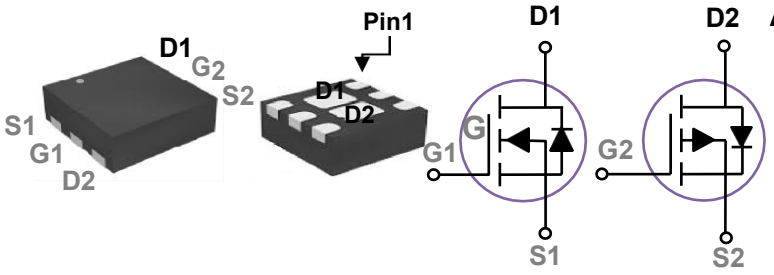
These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.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

BVDSS	RDSON	ID
20V	20mΩ	5A
-20V	56mΩ	-3.5A

Features

- *Fast switching*
- *Green Device Available*

DFN2X2 Dual 2EP Pin Configuration



Applications

- *Notebook*
- *Load Switch*
- *Networking*
- *Hand-held Instruments*

Absolute Maximum Ratings Tc=25℃ unless otherwise noted

Symbol	Parameter	Rating		Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	±12	±12	V
I_D	Drain Current – Continuous (T_A=25℃)	5	-3.5	A
	Drain Current – Continuous (T_A=70℃)	3.5	-2.5	A
I_{DM}	Drain Current – Pulsed[1]	20	-14	A
P_D	Power Dissipation (T_A=25℃)	1.25		W
	Power Dissipation – Derate above 25℃	0.01		W/℃
T_{STG}	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range 1	-55 to 150		℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	100	℃/W

N-CH 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	20	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=16V , V_{GS}=0V , T_J=125℃	---	---	10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V , V_{DS}=0V	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V , I_D=4A	---	20	30	mΩ
		V_{GS}=2.5V , I_D=3A	---	24	40	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	0.4	0.7	1	V
gfs	Forward Transconductance	V_{DS}=10V , I_D=1A	---	4	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[2,3]	V_{DS}=10V , V_{GS}=4.5V , I_D=3A	---	5.3	---	nC
Q_{gs}	Gate-Source Charge[2,3]		---	0.5	---	
Q_{gd}	Gate-Drain Charge[2,3]		---	1.8	---	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=10V , V_{GS}=4.5V , R_G=6Ω I_D=3A	---	4.1	---	ns
T_r	Rise Time[2,3]		---	11.6	---	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	23.9	---	
T_f	Fall Time[2,3]		---	7.6	---	
C_{iss}	Input Capacitance	V_{DS}=10V , V_{GS}=0V , F=1MHz	---	490	---	pF
C_{oss}	Output Capacitance		---	90	---	
C_{rss}	Reverse Transfer Capacitance		---	70	---	

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	---	---	5	A
I_{SM}	Pulsed Source Current		---	---	10	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	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.

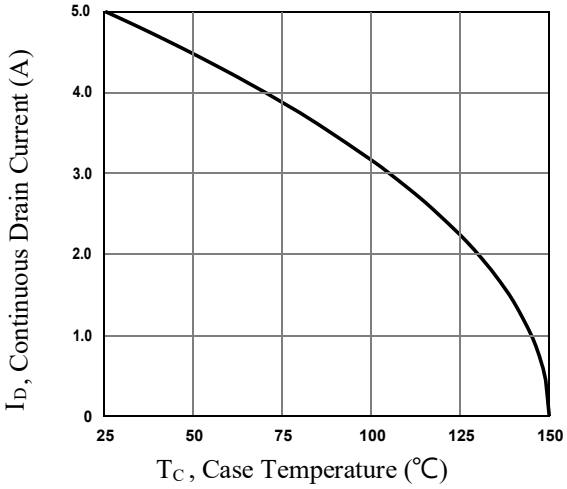


Fig.1 Continuous Drain Current vs. T_C

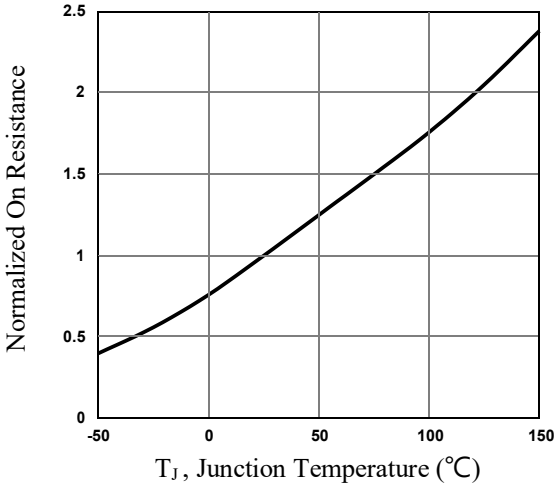


Fig.2 Normalized RDSON vs. T_J

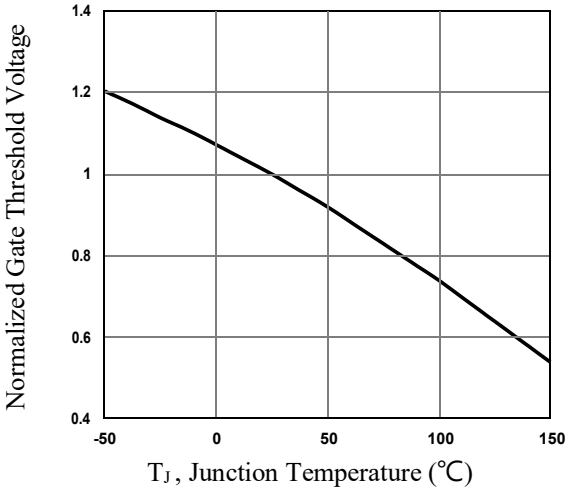


Fig.3 Normalized V_{th} vs. T_J

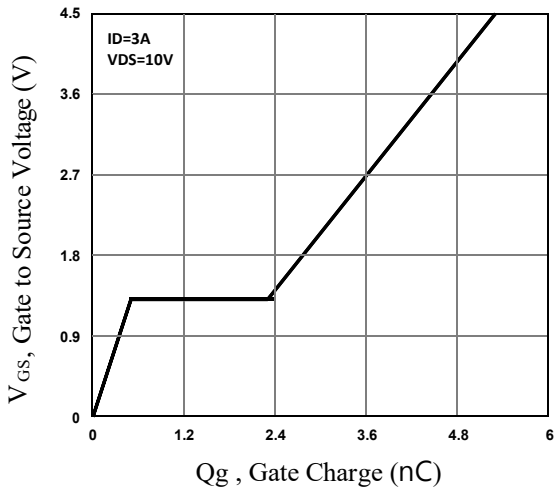


Fig.4 Gate Charge Waveform

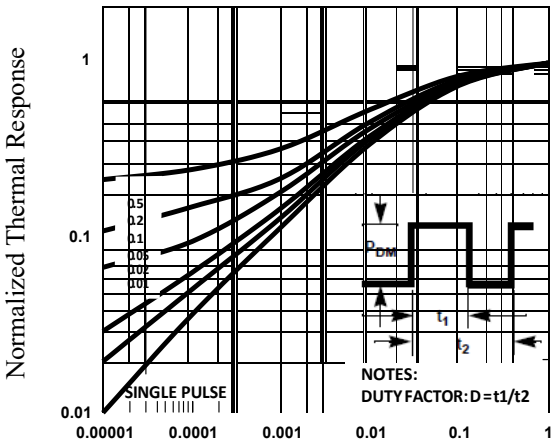


Fig.5 Normalized Transient Impedance

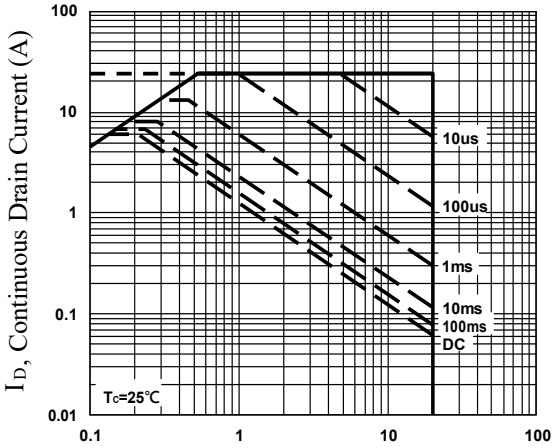


Fig.6 Maximum Safe Operation Area

P-CH 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	-20	---	---	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-16V , V_{GS}=0V , T_J=125℃	---	---	-10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V , V_{DS}=0V	---	---	±100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V , I_D=-3A	---	56	75	mΩ
		V_{GS}=-2.5V , I_D=-2A	---	75	95	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-0.4	-0.7	-1.0	V
gfs	Forward Transconductance	V_{DS}=-10V , I_D=-1A	---	4	---	S

Dynamic and switching Characteristics

Q_g	Total Gate Charge[4,5]	V_{DS}=-10V , V_{GS}=-4.5V , I_D=-2A	---	6.4	---	nC
Q_{gs}	Gate-Source Charge[4,5]		---	0.9	---	
Q_{gd}	Gate-Drain Charge[4,5]		---	1.6	---	
$T_{d(on)}$	Turn-On Delay Time[4,5]	V_{DD}=-10V , V_{GS}=-4.5V , R_G=6Ω I_D=-2A	---	5	---	ns
T_r	Rise Time[4,5]		---	17.4	---	
$T_{d(off)}$	Turn-Off Delay Time[4,5]		---	40.7	---	
T_f	Fall Time[4,5]		---	11.4	---	
C_{iss}	Input Capacitance	V_{DS}=-10V , V_{GS}=0V , F=1MHz	---	540	---	pF
C_{oss}	Output Capacitance		---	80	---	
C_{rss}	Reverse Transfer Capacitance		---	75	---	

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	---	---	-3.5	A
I_{SM}	Pulsed Source Current		---	---	-7.0	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V

Note :

4. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
5. Essentially independent of operating temperature.

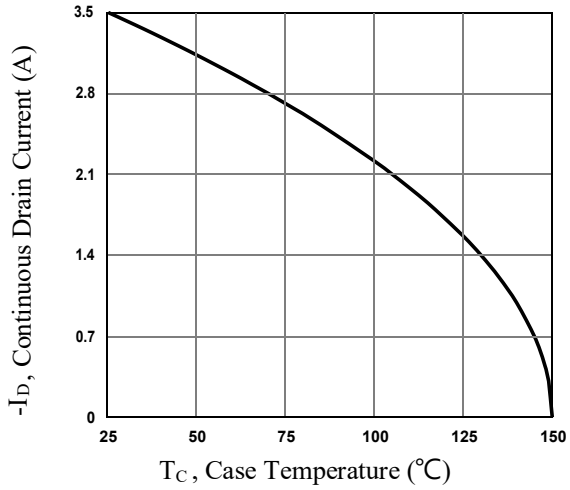


Fig.7 Continuous Drain Current vs. T_C

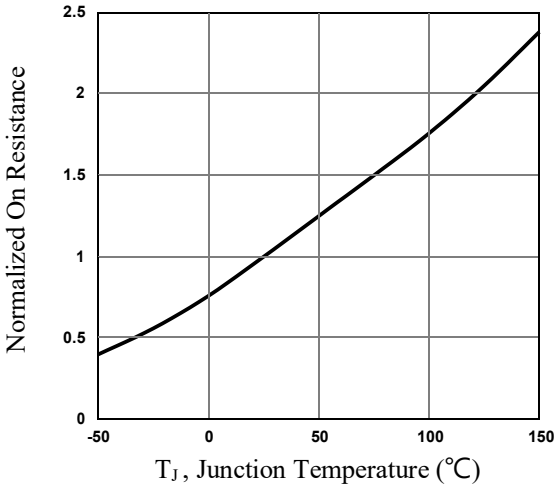


Fig.8 Normalized RDSON vs. T_J

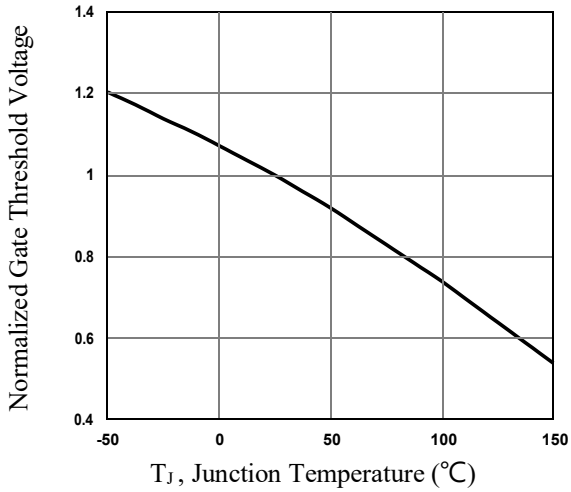


Fig.9 Normalized V_{th} vs. T_J

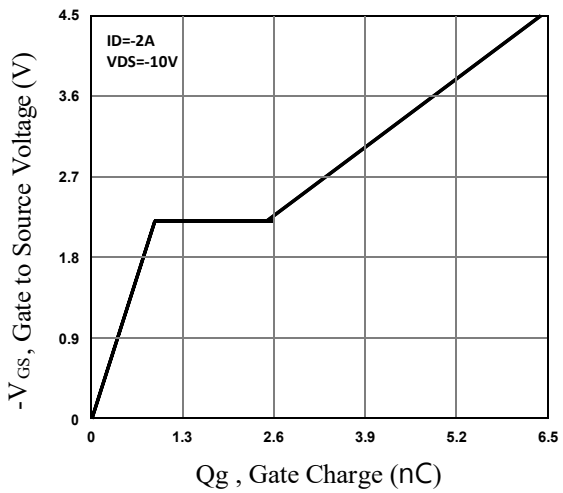


Fig.10 Gate Charge Waveform

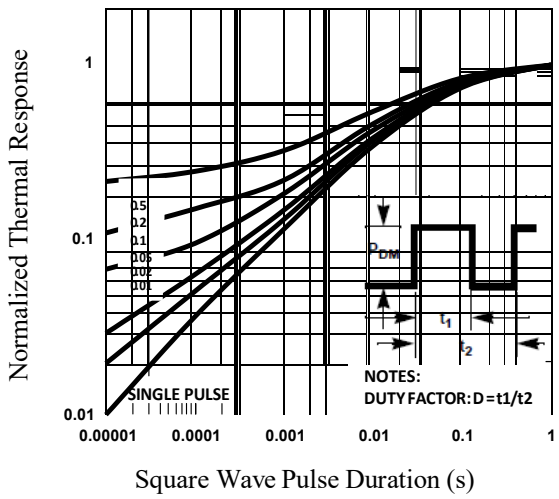


Fig.11 Normalized Transient Impedance

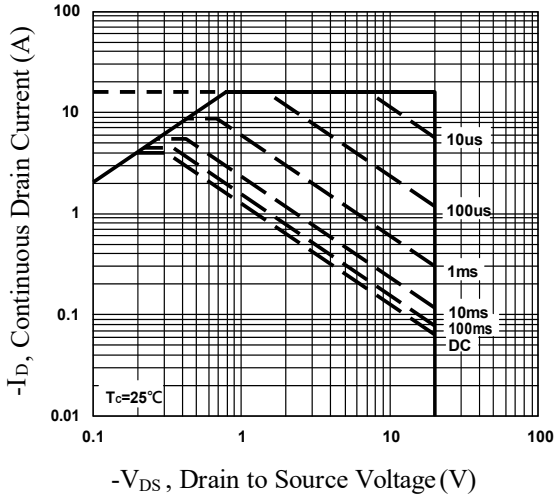
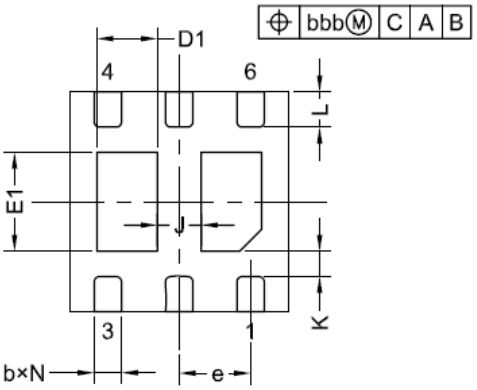
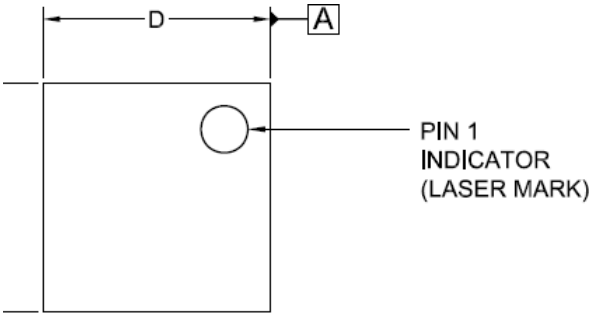


Fig.12 Maximum Safe Operation Area

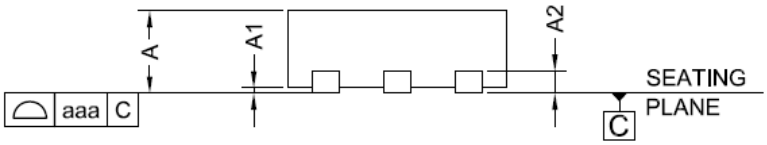
DFN2X2 Dual 2EP PACKAGE INFORMATION



BOTTOM VIEW



TOP VIEW



SIDE VIEW

COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2		0.203	
b	0.20	0.25	0.30
D	1.95	2.00	2.05
D1	0.50	0.55	0.60
E	1.95	2.00	2.05
E1	0.85	0.90	0.95
e		0.65BSC	
L	0.27	0.32	0.37
J		0.40BSC	
K		0.20MIN	
N		6	
aaa		0.08	
bbb		0.10	