N-Channel Enhancement Mode Power MOSFET with ESD Protection

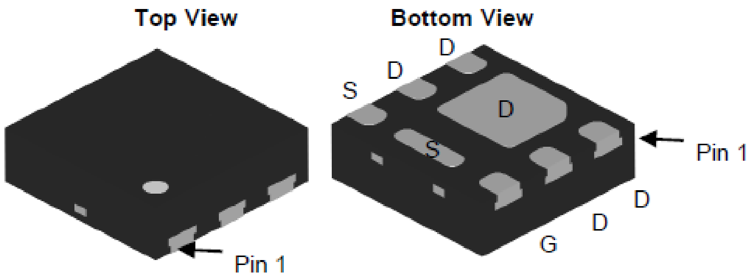
Features

V_{DS} = 20V,
I_D = 11.5A
$R_{DS(ON)}$ @V_{GS}= 4.5V, TYP 10.5mΩ
$R_{DS(ON)}$ @V_{GS}= 2.5V, TYP 14mΩ

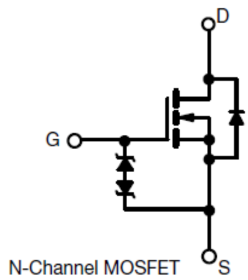
General Description

- load switch
- battery protection applications
- ESD Protection

Pin Configurations



DFN2*2-6L



Absolute Maximum Ratings @T_A=25℃ unless otherwise noted

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DSS}	20	V
Gate-Source Voltage		V_{GSS}	±12	V
Drain Current (Continuous) *AC	T_A=25°C	I_D	11.5	A
	T_A=70°C		9.2	
Drain Current (Pulse) *B		I_{DM}	32	A
Power Dissipation	T_A=25°C	P_D	2.8	W
Operating Temperature/ Storage Temperature		T_J/T_{STG}	-55~150	℃

Thermal Resistance Ratings

Parameter		Symbol	Maximum	Unit
Maximum Junction-to-Ambient	t ≤ 10 s	R_{thJA}	45	°C/W

- **Electrical Characteristics** @T_A=25℃ unless otherwise noted

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D= 250μA	20	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V	--	--	1	μA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_{DS}= 250μA	0.4	0.7	1	V
Gate Leakage Current	I_{GSS}	V_{GS}= ±10V, V_{DS}=0V	--	--	±10	μA
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 8A	--	10.5	14	mΩ
	$R_{DS(on)}$	V_{GS} = 2.5V, I_D = 4A	--	14	18	mΩ
Diode Forward Voltage	V_{SD}	I_{SD}= 1A , V_{GS}=0V	--	0.75	1	V
Diode Forward Current *AC	I_S	T_A =25°C	--	--	3.7	A
Switching						
Total Gate Charge	Q_g	V_{GS}=4.5V, V_{DS}=10V, I_D=8A	--	7	--	nC
Gate-Source Charge	Q_{gs}		--	1	--	nC
Gate-Drain Charge	Q_{gd}		--	2.4	--	nC
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=4.5V, V_{DS}=10V, R_L=1.25Ω, R_{GEN}=3Ω	--	3	--	ns
Turn-on Rise Time	t_r		--	4.5	--	ns
Turn-off Delay Time	$t_{d(off)}$		--	28	--	ns
Turn-Off Fall Time	t_f		--	6	--	ns
Dynamic						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}= 10V, f=1MHz	--	790	--	pF
Output Capacitance	C_{oss}		--	164	--	pF
Reverse Transfer Capacitance	C_{rss}		--	103	--	pF

A: The value of $R_{\theta JA}$ is measured with the device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The current rating is based on the t≤ 10s junction to ambient thermal resistance rating, package limited 8A.

Typical Performance Characteristics（(TJ = 25 °C, unless otherwise noted)）

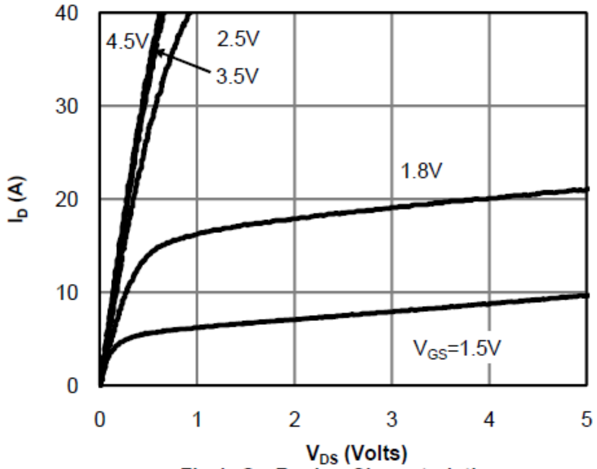


Fig 1: On-Region Characteristics

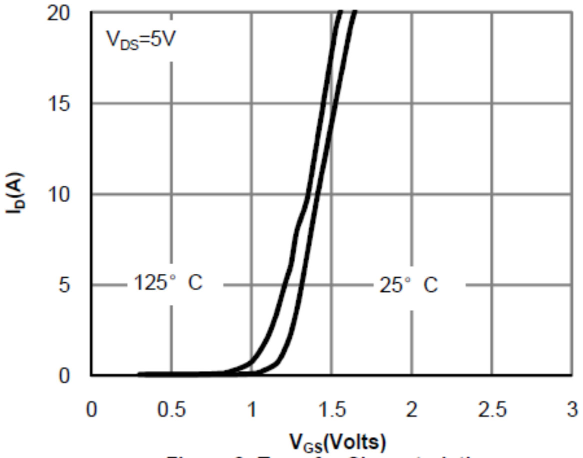


Figure 2: Transfer Characteristics

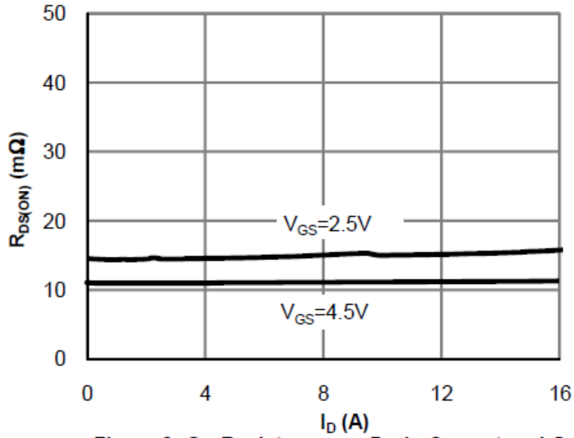


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

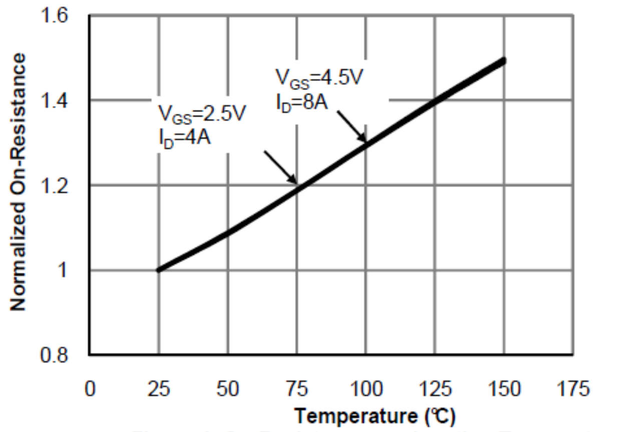


Figure 4: On-Resistance vs. Junction Temperature

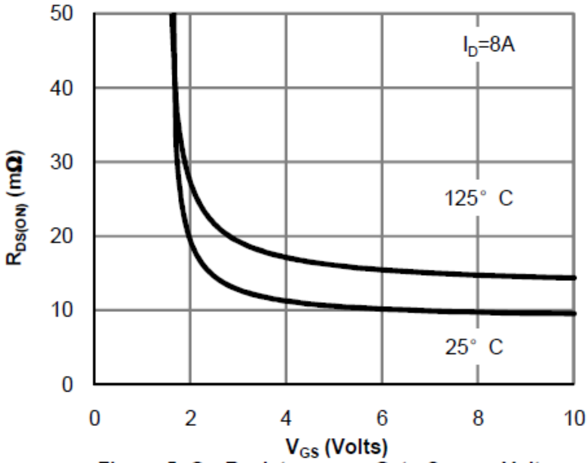


Figure 5: On-Resistance vs. Gate-Source Voltage

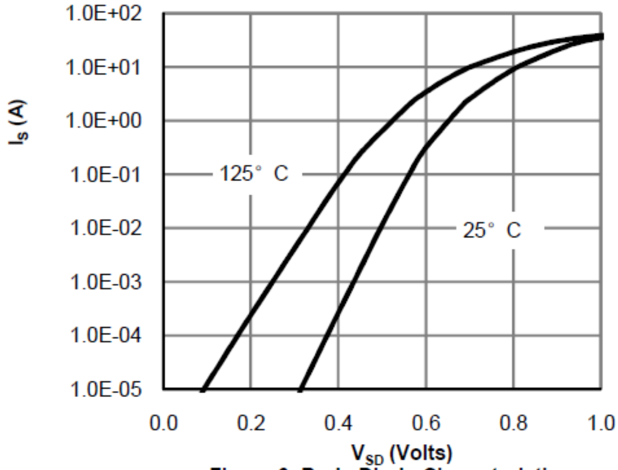


Figure 6: Body-Diode Characteristics

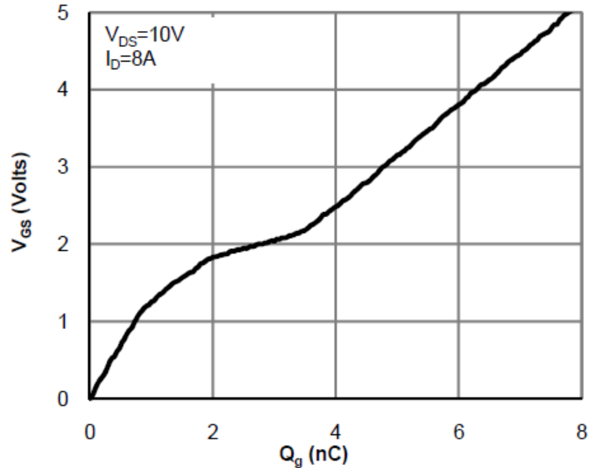


Figure 7: Gate-Charge Characteristics

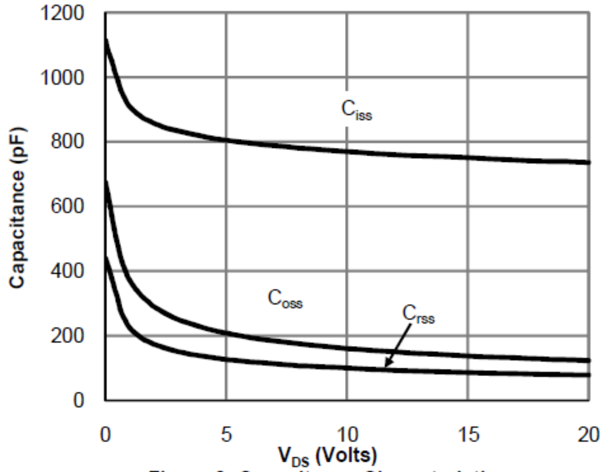


Figure 8: Capacitance Characteristics

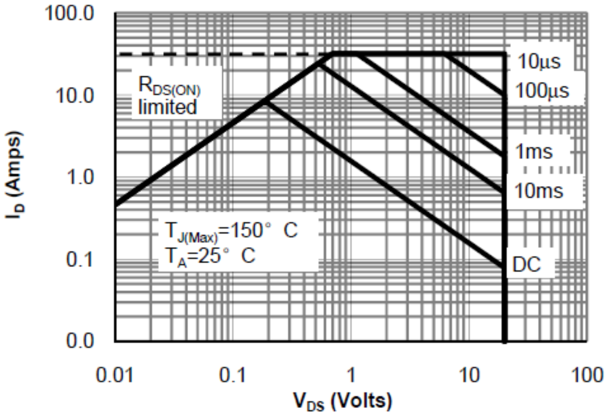


Figure 9: Maximum Forward Biased Safe Operating Area

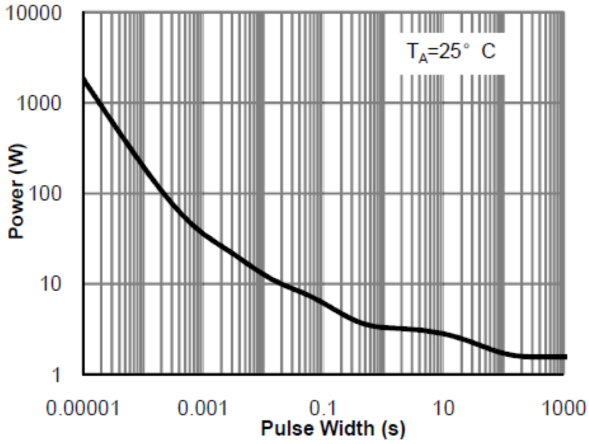


Figure 11: Single Pulse Power Rating Junction-to-Ambient

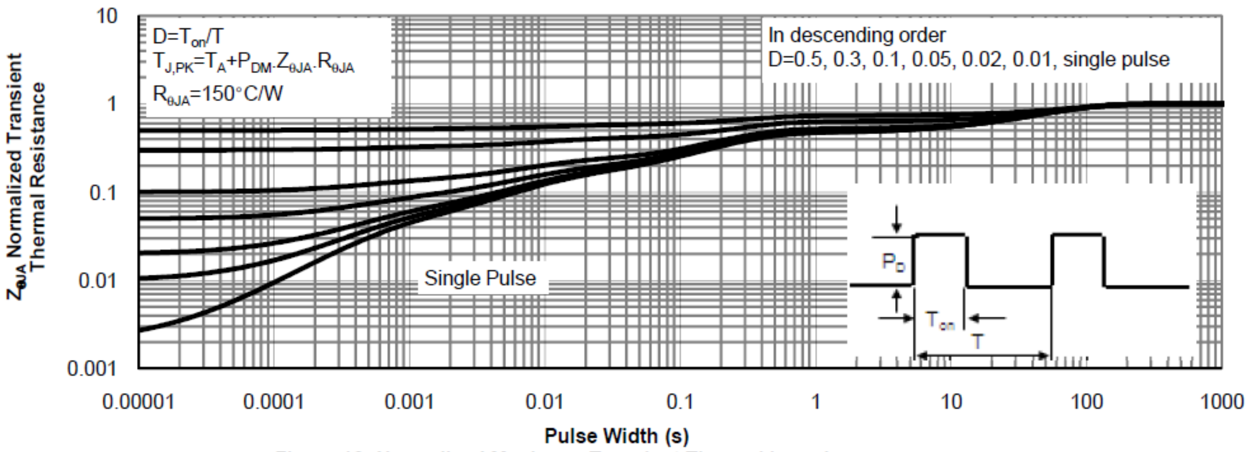
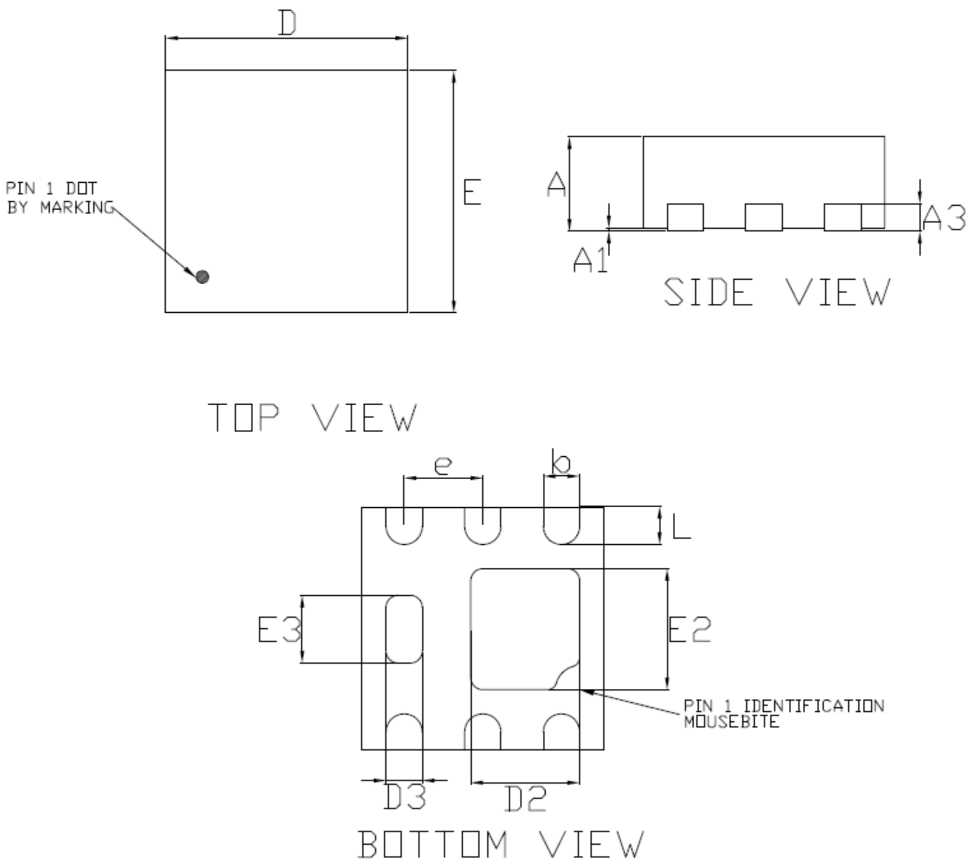


Figure 12: Normalized Maximum Transient Thermal Impedance

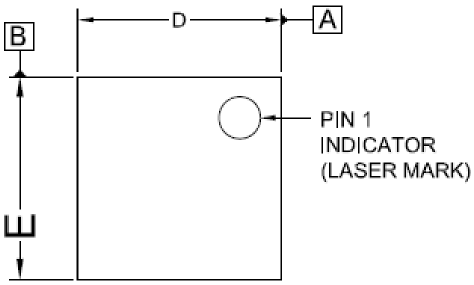
- **Package Information**

DFN2X2-6 Package Out Line A

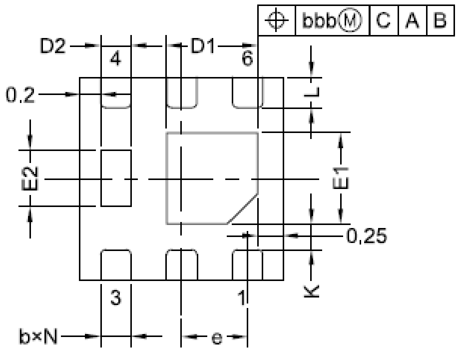


COMMON DIMENSIONS(MM)			
PKG.	W:VERY VERY THIN		
REF.	MIN.	NOM.	MAX
A	0.70	0.75	0.80
A1	0.00	–	0.05
A3	0.20 REF.		
D	1.95	2.00	2.05
E	1.95	2.00	2.05
D2	0.85	0.90	0.95
E2	0.95	1.00	1.05
D3	0.25	0.30	0.35
E3	0.51	0.56	0.61
b	0.25	0.30	0.35
L	0.25	0.30	0.35
e	0.65 BSC		

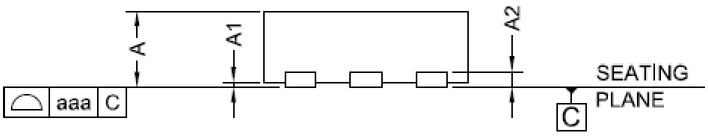
DFN2X2-6 Package Out Line B



TOP VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX
A	0.50	0,55	0.60
A1	0,00	0.02	0,05
A2		0.152REF.	
b	0,25	0.30	0,35
D	1.95	2.00	2,05
D1	0.80	0.90	1.00
D2	0.25	0.30	0.35
E	1.95	2,00	2,05
E1	0.80	0,90	1.00
E2	0.46	0,56	0.66
e		0.65BSC	
L	0,25	0.30	0,35
J		0.40BSC	
K		0,20MIN	
N		6	
aaa		0,08	
bbb		0.10	

NOTES:
1.CONTROLLING DIMENSIONS ARE IN MILLIMETERS(ANGLES IN DEGREES).
2. COPLANARITY APPLIES TO THE EXPOSED PAD AS THE TERMINALS.

Flow (wave) soldering (solder dipping)

Product	Peak Temperature	Dipping Time
Pb device	245℃±5℃	5sec±1sec
Pb-Free device	260℃+0/-5℃	5sec±1sec

This integrated circuit can be damaged by ESD UniverChip Corporation recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedure can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Attention:

- Any and all XPX power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your XPX power representative nearest you before using any XPX power products described or contained herein in such applications.

- XPX power assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all XPX power products described or contained herein.

- Specifications of any and all XPX power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

- XPX power Semiconductor CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

- In the event that any or all XPX power products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

-

- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. XPX power believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

- Any and all information described or contained herein are subject to change without notice due to product/ technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the XPX power product that you intend to use.

- This catalog provides information as of Sep.2019. Specifications and information herein are subject to change without notice.