XPX3N1U5RD

30V N-Channel Super Trench Power MOSFET

Description

The XPX3N1U5RD uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g. This device is ideal for high-frequency switching and synchronous rectification.

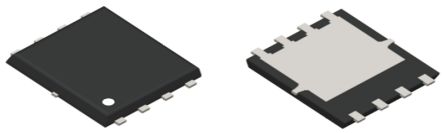
V_{DS} =30V,I_D =150A

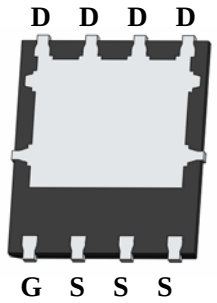
$R_{DS(ON)}$=1.5mΩ (typ) @ V_{GS}=10V

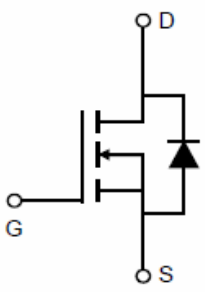
$R_{DS(ON)}$=1.9mΩ (typ) @ V_{GS}=4.5V

General Features

- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested







Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
XPX3N1U5RD	XPX3N1U5RD	DFN5X6-8L	-	-	-

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous **(Silicon Limited)**	I_D	150	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	125	A
Pulsed Drain Current **(Package Limited)**	I_{DM}	348	A
Maximum Power Dissipation	P_D	87	W
Derating factor		0.65	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	660	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃
Thermal Resistance,Junction-to-Case (Note 2)	$R_{\theta JC}$	1.51	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

Parameter	Symbol		Condition	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}		V_{GS}=0V I_D=250μA	30		-	V
Zero Gate Voltage Drain Current	I_{DSS}	T_J=25℃	V_{DS}=30V,V_{GS}=0V	-	-	1	μA
		T_J=55℃		-	-	1.5	μA
Gate-Body Leakage Current	I_{GSS}		V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)							
Gate Threshold Voltage	$V_{GS(th)}$		V_{DS}=V_{GS},I_D=250μA	1.2	1.8	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$		V_{GS}=10V, I_D=75A	-	1.5	1.9	mΩ
			V_{GS}=4.5V, I_D=75A	-	2.0	2.4	mΩ
Forward Transconductance	g_{FS}		V_{DS}=5V,I_D=75A		65	-	S
Dynamic Characteristics (Note4)							
Input Capacitance	C_{lss}		V_{DS}=15V,V_{GS}=0V, F=1.0MHz	-	3198	-	PF
Output Capacitance	C_{oss}			-	918	-	PF
Reverse Transfer Capacitance	C_{rss}			-	64	-	PF
Switching Characteristics (Note 4)							
Turn-on Delay Time	$t_{d(on)}$		V_{DD}=15V,I_D=75A V_{GS}=10V,R_G=1.6Ω	-	6	-	nS
Turn-on Rise Time	t_r			-	6	-	nS
Turn-Off Delay Time	$t_{d(off)}$			-	32	-	nS
Turn-Off Fall Time	t_f			-	9	-	nS
Total Gate Charge	Q_g		V_{DS}=15V,I_D=75A, V_{GS}=10V	-	55	-	nC
Gate-Source Charge	Q_{gs}			-	9		nC
Gate-Drain Charge	Q_{gd}			-	8.5		nC
Drain-Source Diode Characteristics							
Diode Forward Voltage (Note 3)	V_{SD}		V_{GS}=0V,I_S=75A	-		1.2	V
Diode Forward Current (Note 2)	I_S			-	-	150	A
Reverse Recovery Time	t_{rr}		T_J = 25°C, I_F = I_S di/dt = 100A/μs (Note3)	-		26	nS
Reverse Recovery Charge	Qrr			-		95	nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : Tj=25℃,V_{DD}=15V,V_G=10V,L=0.5mH,Rg=25Ω

Typical Electrical and Thermal Characteristics

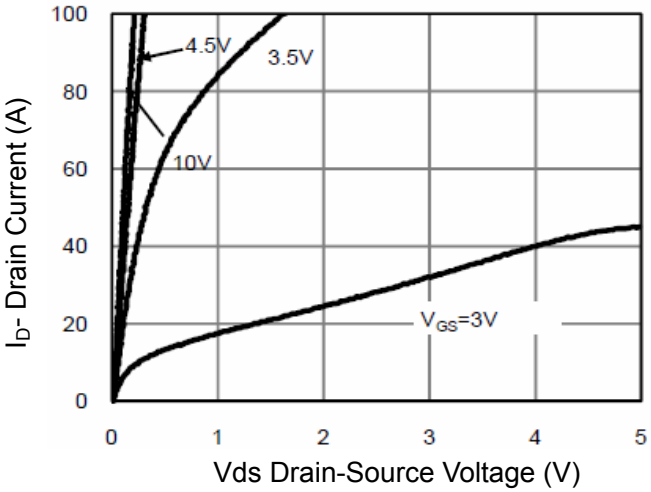


Figure 1 Output Characteristics

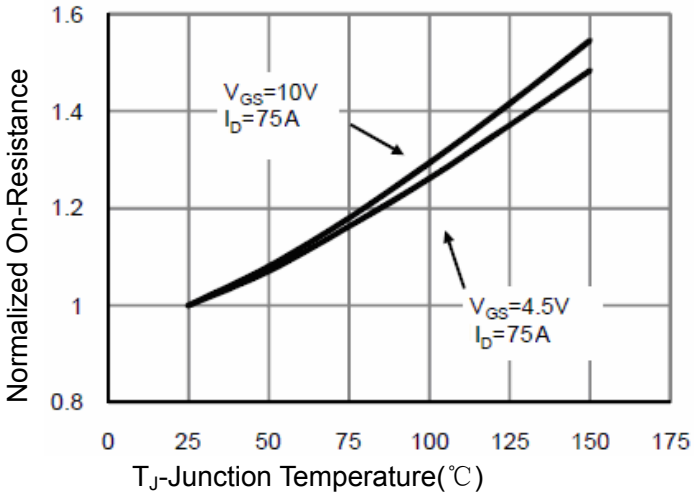


Figure 4 Rdson-Junction Temperature

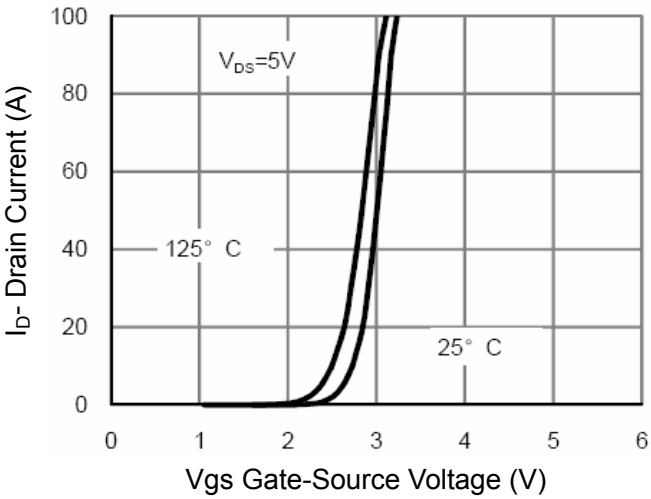


Figure 2 Transfer Characteristics

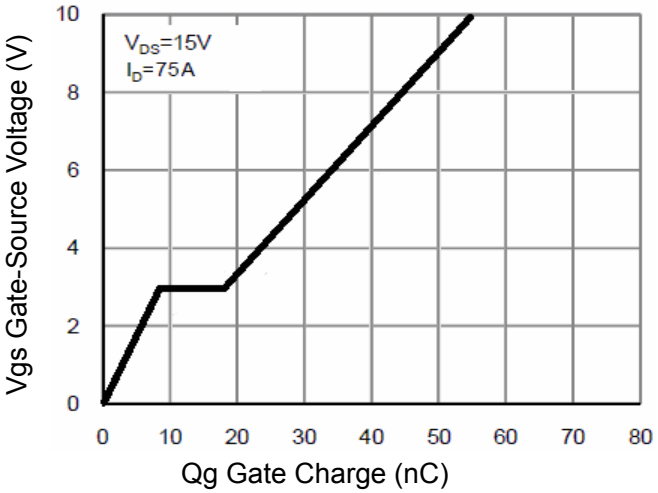


Figure 5 Gate Charge

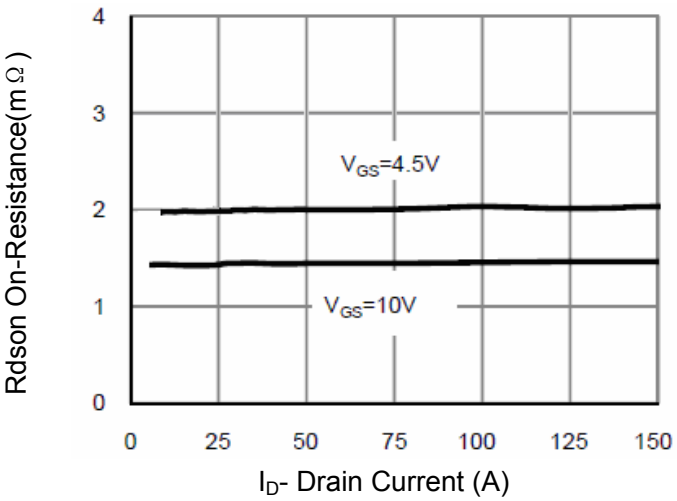


Figure 3 Rdson- Drain Current

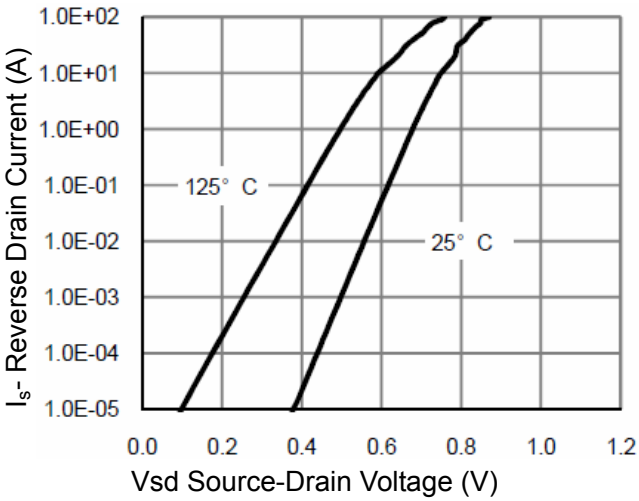


Figure 6 Source- Drain Diode Forward

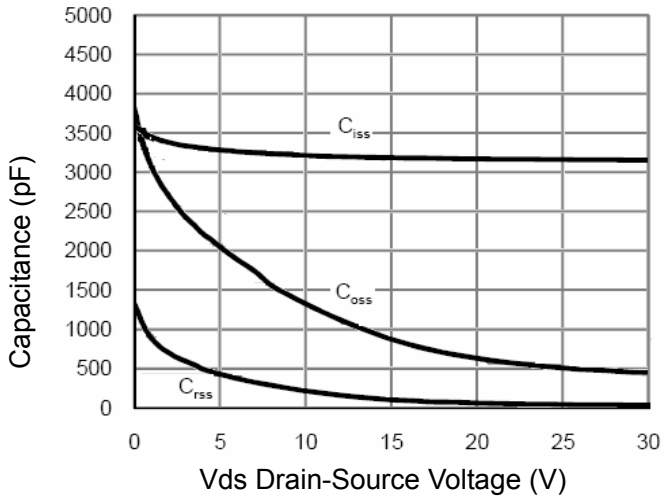


Figure 7 Capacitance vs Vds

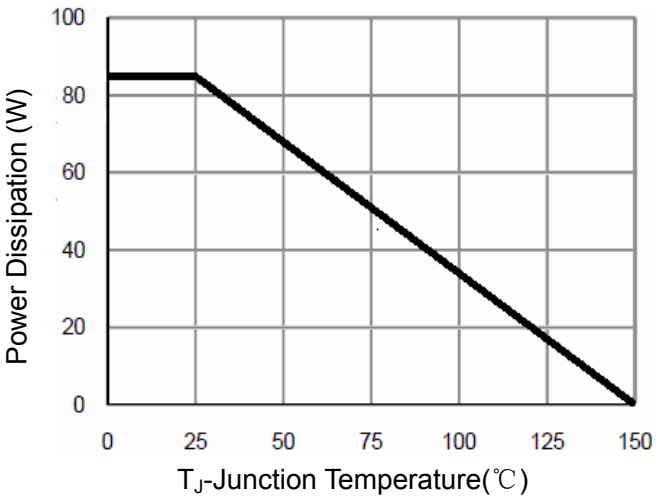


Figure 9 Power De-rating

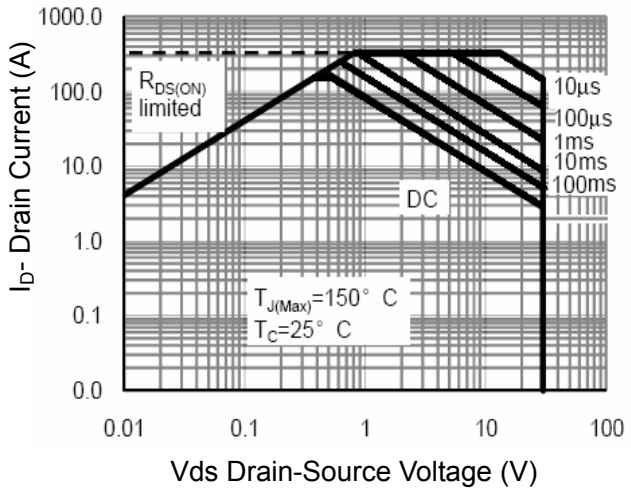


Figure 8 Safe Operation Area

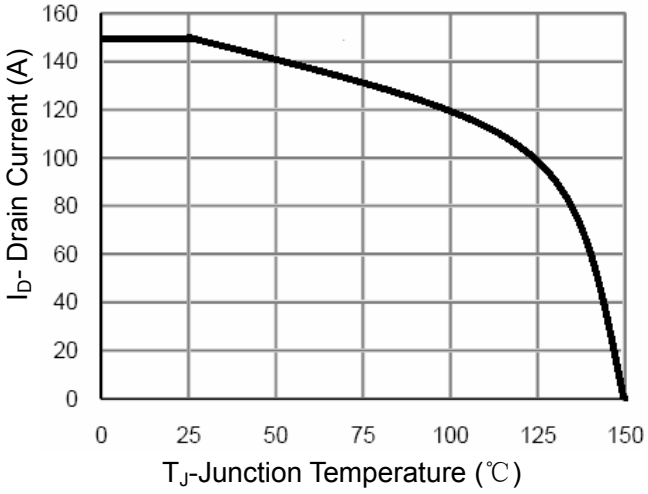


Figure 10 Current De-rating

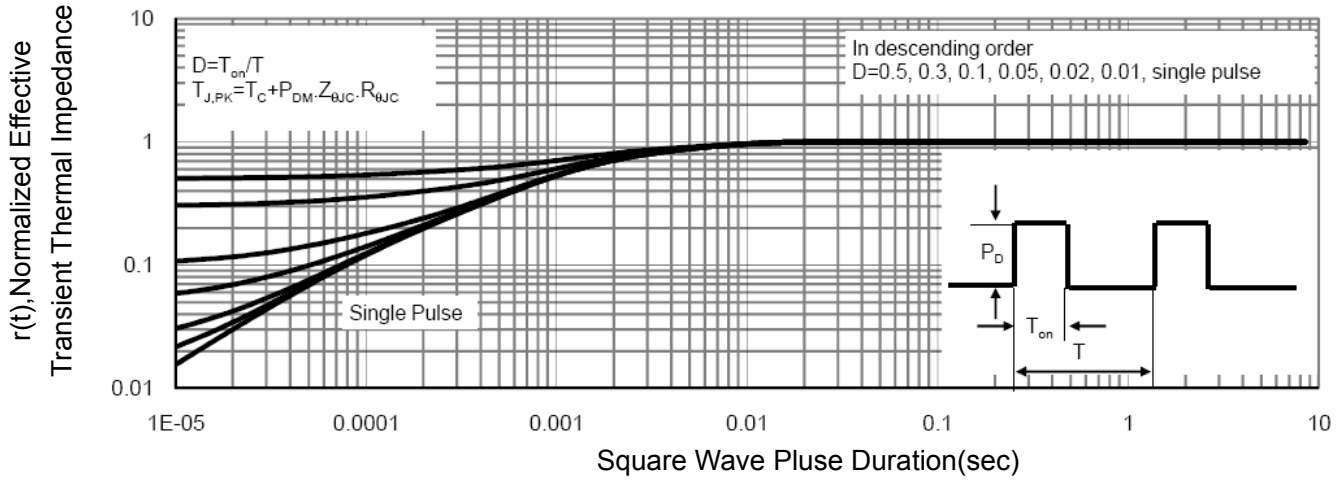
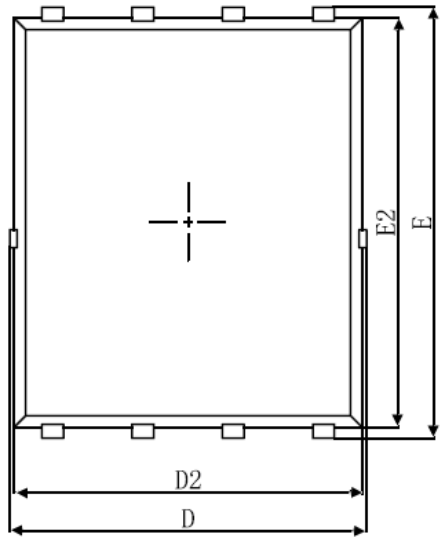
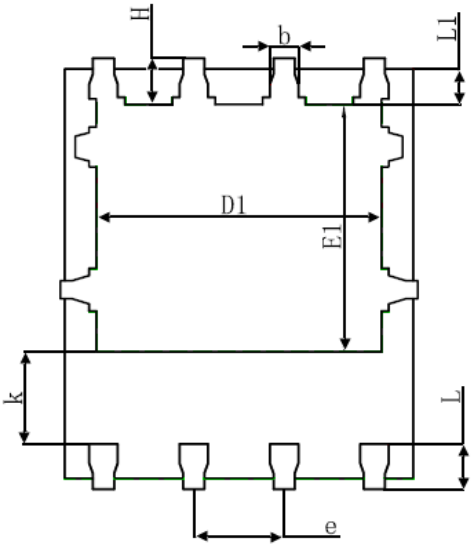


Figure 11 Normalized Maximum Transient Thermal Impedance

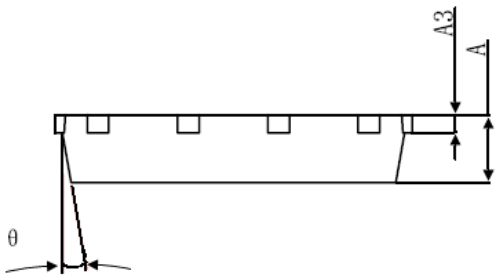
DFN5X6-8L Package Information



Top View
[顶视图]



Bottom View
[背视图]



Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	8°	12°	8°	12°

Flow (wave) soldering (solder dipping)

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

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