POWERX

X3N0125P1

30V N-Channel MOSFETs

General Description

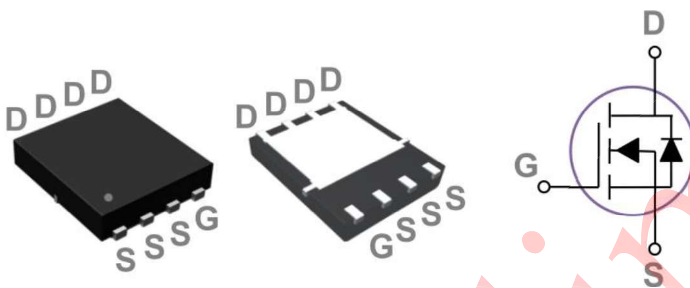
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology is designed to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche period. These devices are well suited for high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

$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
30V	7.2mΩ	65A

Features

- Fast switching
- Improved dv/dt capability
- Green Device Available

Power PAK 5060 Pin Configuration



Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2nd SR

Preliminary

Absolute Maximum Ratings (T_J=25°C, unless otherwise noted)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-Source Voltage		30	V
V_{GS}	Gate-Source Voltage		±20	V
I_D	Drain Current-Continuous [A]	T_C = 25°C	65	A
		T_C = 100°C	41	A
I_{DM}	Drain Current-Pulsed [A,B]		260	A
I_{AS}	Non-repetitive Avalanche Current [E]		30	A
E_{AS}	Single Pulse Drain-to-Source Avalanche Energy [E]		45	mJ
P_D	Maximum Power Dissipation	T_C = 25°C	54	W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C

Thermal Characteristics

Symbol	Parameter	Conditions	Value	Unit
$R_{\theta JA}$	Junction-to-Ambient [C]	Steady State	62	°C/W
$R_{\theta JC}$	Junction-to-Case	Steady State	2.3	°C/W

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

Static State Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_{DS} = 250μA	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C	-	-	10	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_{DS} = 250μA	1.2	1.6	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS} = 10V, I_{DS} = 16A	-	6.2	7.2	mΩ
		V_{GS} = 4.5V, I_{DS} = 8A	-	8.9	12	mΩ
g_{fs}	Forward Transconductance	V_{DS} = 10V, I_{DS} = 8A	-	9.5	-	S

Dynamic Characteristics Note D

Symbol	Parameter		Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance		V_{DS} = 25V, V_{GS} = 0V, f = 1MHz	-	680	-	pF
C_{oss}	Output Capacitance			-	150	-	pF
C_{rss}	Reverse Transfer Capacitance			-	70	-	pF
R_g	Gate Resistance		V_{DS} = 0V, f = 1MHz	-	2.7	-	Ω
Q_g	Total Gate charge	V_{GS} = 4.5V	V_{DD} = 15V, I_{DS} = 20A	-	7.5	-	nC
Q_{gs}	Gate to Source Charge			-	4.5	-	nC
Q_{gd}	Gate to Drain Charge			-	1.3	-	nC
$T_{d(on)}$	Turn-On Delay Time		V_{DD} = 15V, V_{GS} = 10V, I_{DS} = 15A, $R_{G,ext}$ = 3.3Ω	-	4.8	-	ns
t_r	Rise Time			-	12.5	-	ns
$T_{d(off)}$	Turn-Off Delay Time			-	27.6	-	ns
t_f	Fall Time			-	8.2	-	ns

Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Diode continuous forward current	-	-	-	65	A
I_{SM}	Diode pulse current	-	-	-	130	A
V_{SD}	Diode Forward Voltage B	V_{GS} = 0V, I_S = 1A	-	-	1	V
trr	Diode Reverse Recovery Time	I_S = 10A, di/dt = 100A/μs	-	8.1	-	ns
Qrr	Diode Reverse Recovery Charge		-	1.6	-	nC

Note A, The maximum current rating is package limited.
Note B, The test condition is pulse width ≤ 300us, duty cycle ≤ 2%.
Note C, The $R_{θJA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. copper, determined by the PCB design, in a still air environment with T_A=25°C.
Note D, The switching characteristics are independent of operating junction temperatures. Not subject to product testing.
Note E, Maximum UIS current limited by test equipment. The test condition is L=0.1mH, Starting T_J=25°C.

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