

## 30V P-Channel MOSFETs

### General Description

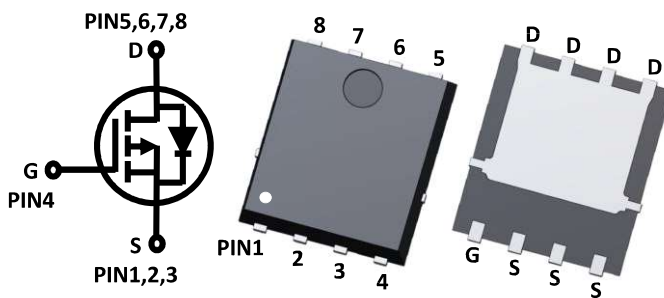
These P-Channel enhancement mode power field effect transistors are using trench - technology. This advanced technology is designed to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche period. These devices are well suited for high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

$V_{(BR)DSS}$	$R_{DS(ON)}$	$I_D$
-30V	4.5m $\Omega$	-90A

### Features

- Advanced Trench Process
- Low- $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability

### Power PAK 5060 Pin Configuration



### Applications

- Load Switch
- Switching Power Supplies
- Battery Power Management

### Absolute Maximum Ratings ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

Symbol	Parameter	Value	Unit	
$V_{DS}$	Drain-Source Voltage	-30	V	
$V_{GS}$	Gate-Source Voltage	$\pm 20$		
$I_D$	Drain Current-Continuous <sup>A</sup>	$T_A = 25^\circ\text{C}$	-23	A
		$T_A = 70^\circ\text{C}$	-18	
		$T_C = 25^\circ\text{C}$	-90	
		$T_C = 100^\circ\text{C}$	-56	
$I_{DM}$	Drain Current-Pulsed <sup>A, B</sup>	$T_A = 25^\circ\text{C}$	-210	W
$I_{AS}$	Non-repetitive Avalanche Current <sup>E</sup>		-66	
$E_{AS}$	Single Pulse Drain-to-Source Avalanche Energy <sup>E</sup>		217.8	
$P_D$	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	3.5	W
		$T_C = 25^\circ\text{C}$	104	
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$	

### Thermal Characteristics

Symbol	Parameter	Conditions	Value	Unit
$R_{\theta JA}$	Junction-to-Ambient <sup>C</sup>	Steady State	35	$^\circ\text{C/W}$
$R_{\theta JC}$	Junction-to-Case	Steady State	1.2	$^\circ\text{C/W}$

## Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

### Static State Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V	-	-	-1	μA
		V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C	-	-	-10	μA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.2	-1.6	-2.2	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> = -10V, I <sub>D</sub> = -30A	-	3.5	4.5	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -20A	-	5	7	mΩ
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> = -10V, I <sub>D</sub> = -5A	-	25	-	S

### Dynamic Characteristics Note D

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15V, V <sub>GS</sub> = 0V, f = 1MHz	-	6100	-	pF	
C <sub>oss</sub>	Output Capacitance		-	850	-	pF	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	400	-	pF	
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> = 0V, f = 1MHz	-	3	-	Ω	
Q <sub>g</sub>	Total Gate charge	V <sub>DD</sub> = -15V, I <sub>DS</sub> = -30A	V <sub>GS</sub> = 10V	-	100	-	nC
			V <sub>GS</sub> = 4.5V	-	49	-	nC
Q <sub>gs</sub>	Gate to Source Charge		-	20	-	nC	
Q <sub>gd</sub>	Gate to Drain Charge		-	20	-	nC	
T <sub>d(on)</sub>	Turn-On Delay Time		-	16	-	ns	
t <sub>r</sub>	Rise Time		V <sub>DD</sub> = -15V, V <sub>GS</sub> = -10V,	-	100	-	ns
T <sub>d(off)</sub>	Turn-Off Delay Time	I <sub>DS</sub> = -30A, R <sub>G,ext</sub> = 6Ω	-	125	-	ns	
t <sub>f</sub>	Fall Time		-	120	-	ns	

### Drain-Source Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Diode continuous forward current	-	-	-	-90	A
I <sub>SM</sub>	Diode pulse current <sup>B</sup>	-	-	-	-210	A
V <sub>SD</sub>	Diode Forward Voltage <sup>B</sup>	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A	-	-	-1	V
t <sub>rr</sub>	Diode Reverse Recovery Time	I <sub>S</sub> = -30A, di/dt = 100A/μs		25		ns
Q <sub>rr</sub>	Diode Reverse Recovery Charge				16	

Note A, The maximum current rating is package limited.

Note B, The test condition is pulse width ≤ 300μs, duty cycle ≤ 2%.

Note C, The R<sub>θJA</sub> is measured with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. copper, determined by the PCB design, in a still air environment with T<sub>A</sub>=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<sub>J</sub>=25°C.