



**45A, 20V & -30A, -15V
N+P CHANNEL MOSFET**

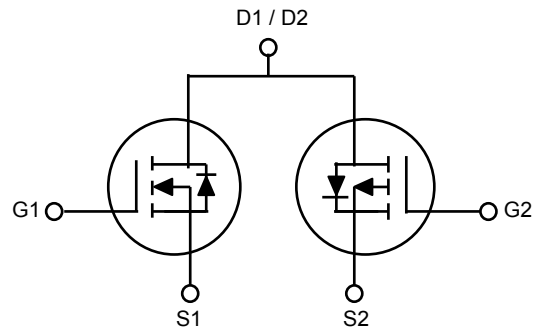
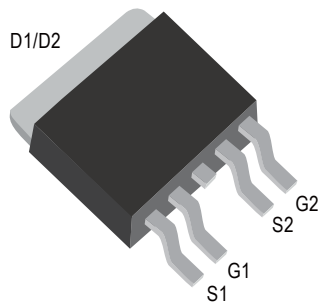
Features

- Advanced process technology
- Ultra low On-Resistance
- 150 °C Operating Temperature
- Fast Switching
- Repetitive Avalanche Allowed up to T_{jmax}
- Lead-Free

Product Summary

Symbol	N	P	Unit
V_{DS}	20	-15	V
$R_{DS(on)}$ typ	8	15	mΩ
I_D	45	-30	A

Package
TO-252-4Pin



ORDERING INFORMATION

Order Number	Package	Pin Assignment					Packing
		1	2	3	4	5	
HPD180PNE1DTA	TO-252-4	S1	G1	D1/D2	S2	G2	Tube Reel

ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Conditions	N-Channel	P-Channel	Unit
Drain source voltage	V_{DS}		20	-15	V
Gate source voltage	V_{GS}		± 12	± 12	
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	45	-30	A
		$T_C=100^\circ\text{C}$	20	-16	
Pulsed Drain Current	$I_{D,pulse}$	$T_C=25^\circ\text{C}$	90	-60	
Power dissipation	P_D	$T_C=25^\circ\text{C}$	25	25	W
		$T_C=100^\circ\text{C}$	10	10	
Linear Derating Factor			0.5	0.5	W/°C
Operating Junction and storage temperature Range	T_J, T_{stg}		-55 to 150		°C
Soldering Temperature, for 10 seconds			300 (1.6 mm from case)		

**Thermal characteristics**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction-case	R_{thJC}	TO-252-4Pin	--	--	5.0	°C/W
Junction-to-Ambient (PCB Mount)	R_{thJA}	TO-252-4Pin	--	--	60	

N-Channel Electrical characteristics, at $T_J=25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	20	--	--	V
Gate source voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.4	0.7	1.0	
Zero gate voltage drian current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V, T_J=25^\circ C$	--	0.1	1	μA
Gate-source leakage current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$	--	± 10	± 100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=25A$	--	8	10	m Ω
		$V_{GS}=2.5V, I_D=10A$	--	11	15	
Transconductance	g_{fs}	$V_{DS}=10V, I_D=3A$	10	--	--	S

P-Channel Electrical characteristics, at $T_J=25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	-15	--	--	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	-0.4	-0.7	-1.0	V
Zero gate voltage drian current	I_{DSS}	$V_{DS}=15V, V_{GS}=0V, T_J=25^\circ C$	--	-0.1	-1	μA
Gate-source leakage current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 12V$	--	± 10	± 100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-16A$	--	15	18	m Ω
		$V_{GS}=-2.5V, I_D=-10A$	--	18	25	
Transconductance	g_{fs}	$V_{DS}=-10V, I_D=-3A$	10	--	--	S

**N-Channel Electrical characteristics, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Output capacitance	C_{iss}	$V_{GS}=0V$ $V_{DS}=10V$ $f=1MHz$	--	653	--	pF
Output capacitance	C_{oss}		--	77	--	
Reverse transfer capacitance	C_{rss}		--	57	--	
Turn-on delay time	$t_{d(on)}$	$V_{DS}=10V$ $V_{GS}=4.5V$ $I_D=1A$	--	8.8	--	nS
Rise time	t_r		--	2.2	--	
Turn-off delay time	$t_{d(off)}$		--	39	--	
Fall time	t_f		--	2.8	--	

N-Channel Gate Charge Characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Gate to source charge	Q_{gs}	$V_{DS}=10V$ $I_D=20A$ $V_{GS}=4.5V$	--	1.2	--	nC
Gate to drain charge	Q_{gd}		--	2.7	--	
Gate charge total	Q_g		--	4.5	--	

N-Channel Reverse Diode

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Diode continuous forward current	I_S	$T_C=25\text{ }^\circ\text{C}$	--	--	45	A
Diode pulse current	$I_{S,pulse}$	$T_C=25\text{ }^\circ\text{C}$	--	--	90	
Diode forward voltage	V_{SD}	$V_{GS}=0V$ $I_F=20A, T_C=25\text{ }^\circ\text{C}$	--	0.75	1.2	V
Reverse recovery time	t_{rr}	$V_R=20V, I_F=I_S$ $di_F/dt=100A/\mu s$	--	15	--	μs
Reverse recovery charge	Q_{rr}		--	4	--	nC

**P-Channel Electrical characteristics, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	$V_{GS}=0V$ $V_{DS}=-10V$ $f=1MHz$	--	953	--	pF
Output capacitance	C_{oss}		--	107	--	
Reverse transfer capacitance	C_{rss}		--	77	--	
Turn-on delay time	$t_{d(on)}$	$V_{DS}=-10V$ $V_{GS}=-4.5V$ $I_D=-1A$	--	19	--	nS
Rise time	t_r		--	4.2	--	
Turn-off delay time	$t_{d(off)}$		--	49	--	
Fall time	t_f		--	5.4	--	

P-Channel Gate Charge Characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Gate to source charge	Q_{gs}	$V_{DS}=-10V$ $I_D=-16A$ $V_{GS}=-4.5V$	--	2.6	--	nC
Gate to drain charge	Q_{gd}		--	3.3	--	
Gate charge total	Q_g		--	9.4	--	

P-Channel Reverse Diode

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Diode continuous forward current	I_S	$T_C=25\text{ }^\circ\text{C}$	--	--	-30	A
Diode pulse current	$I_{S,pulse}$	$T_C=25\text{ }^\circ\text{C}$	--	--	-60	
Diode forward voltage	V_{SD}	$V_{GS}=0V$ $I_F=-20A, T_C=25\text{ }^\circ\text{C}$	--	-0.75	-1.2	V
Reverse recovery time	t_{rr}	$V_R=-10V, I_F=I_S$ $di_F/dt=100A/\mu s$	--	15	--	μs
Reverse recovery charge	Q_{rr}		--	4	--	nC



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深圳市浩海电子有限公司

SHENZHEN HAOHAI ELECTRONICS CO., LTD.

2 floor(whole floor), BAOXIN Building. 0 Lane on the 8th. Yufeng Garden.
82 District. BAOAN District, Shenzhen City, Guangdong Province, China.

公司电话 TEL: +86-755-29955080、29955081、29955082、29955083

FAX: +86-755-27801767

<http://www.szhhe.com>

E-mail: kkg@kkg.com.cn

<http://www.kkg.com.cn>