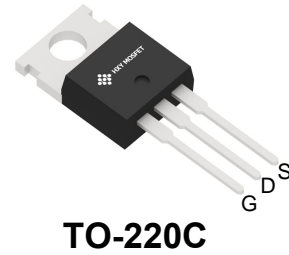




Description

The FDP5N50 can be used in various power switching circuit for system miniaturization and higher efficiency. The package form is TO-220C, which accords with the RoHS standard.

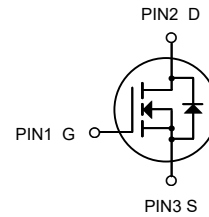


General Features

$V_{DS} = 500V, I_D = 4.5A$
 $R_{DS(ON)} < 1.5\Omega @ V_{GS}=10V$

Application

- Power switch circuit of adaptor and charger.



N-Channel MOSFET

Ordering Information

Product ID	Pack	Brand	Units Tube
FDP5N50	TO-220C	HXY MOSFET	50

Absolute Maximum Ratings@T=25°C (unless otherwise specified)

Symbol	Parameter	Limit	Unit
V_{DSS}	Drain-to-Source Voltage	500	V
V_{GSS}	Gate-to-Source Voltage	± 30	
I_D	Continuous Drain Current ^[1]	4.5	A
$I_D @ T_c=100^\circ C$	Continuous Drain Current @ $T_c=100^\circ C$	2.6	
I_{DM}	Pulsed Drain Current at $V_{GS}=10V^{[1][2]}$	16	
E_{AS}	Single Pulse Avalanche Energy ^[3]	315	mJ
P_D	Power Dissipation ^[1]	139	W
$T_J \& T_{STG}$	Operating and Storage Temperature Range	-55 to 150	°C
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case ^[1]	0.9	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient ^[6]	77	



Electrical Characteristics $T_J=25^{\circ}\text{C}$ unless otherwise specified

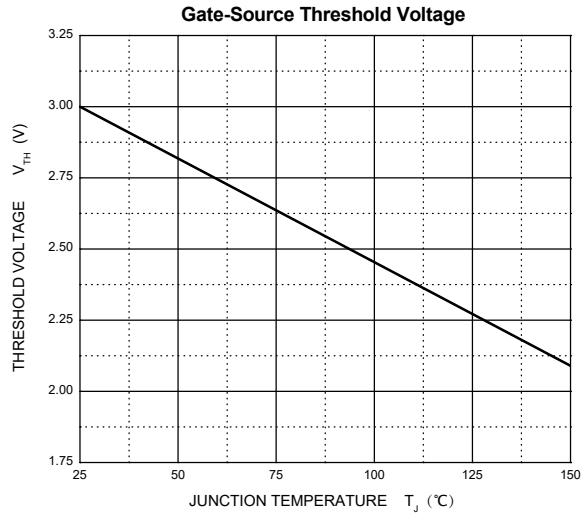
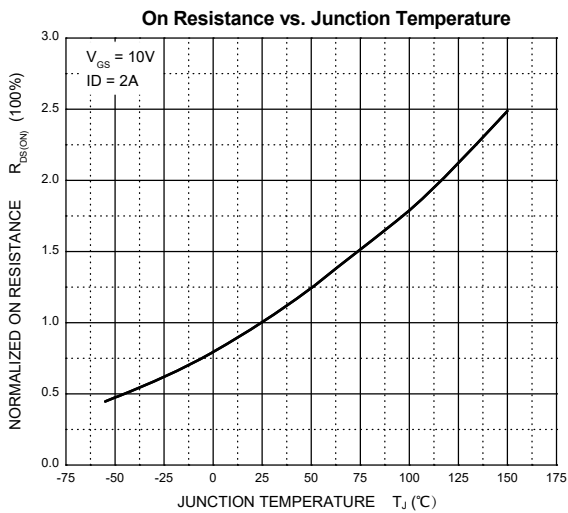
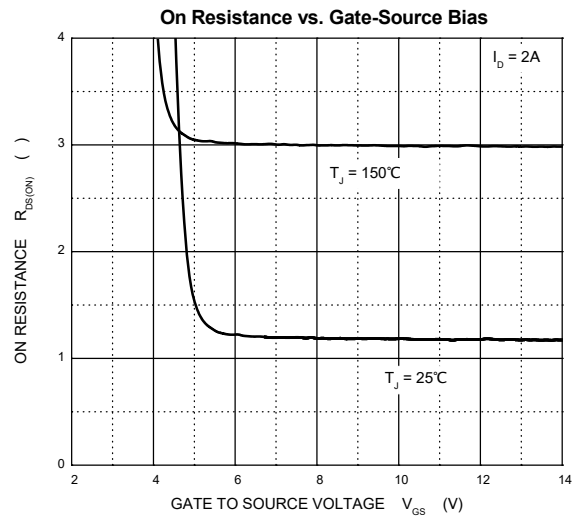
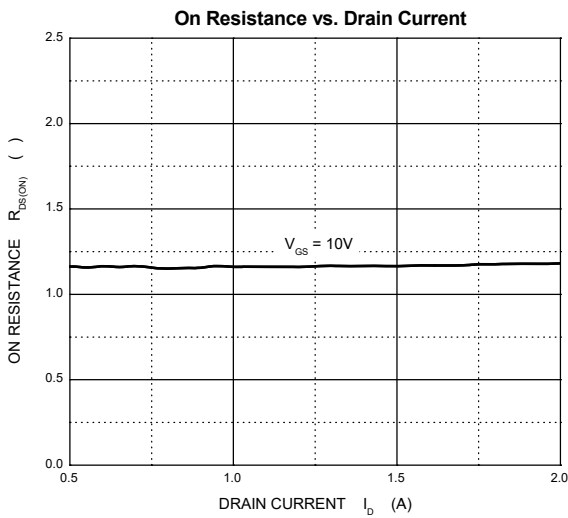
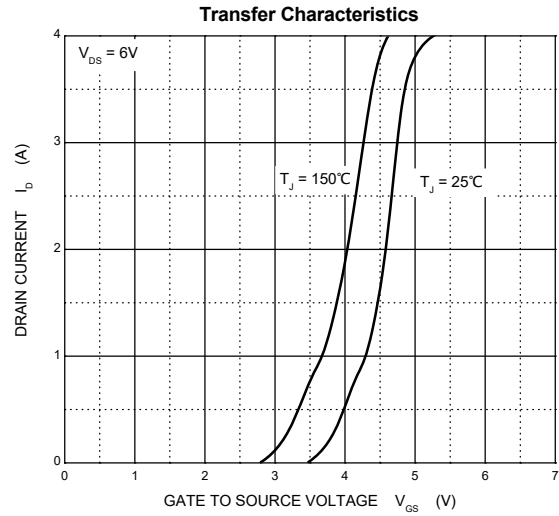
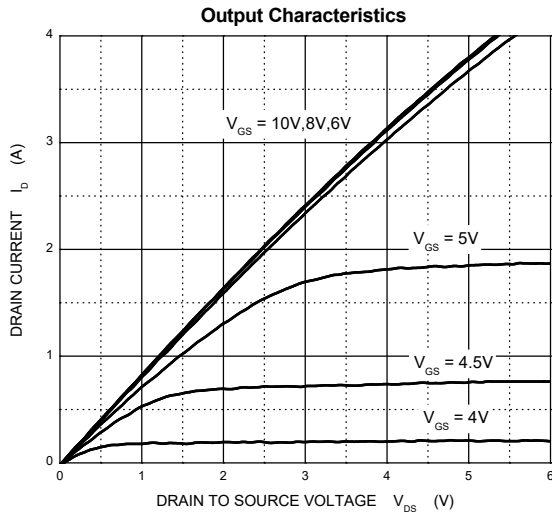
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Off characteristics							
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	500	-	-	V	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=500V,$ $V_{GS}=0V$	$T_J=25^{\circ}\text{C}$	-	-	1.0	μA
			$T_J=125^{\circ}\text{C}$	-	-	100	
Gate-body leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA	
On characteristics ^[4]							
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.0	3.0	4.0	V	
Static drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 2A$	-	1.2	1.5	Ω	
Dynamic characteristics ^[5]							
Input capacitance	C_{iss}	$V_{DS} = 50V, V_{GS} = 0V, f = 1\text{MHz}$	-	639	-	pF	
Output capacitance	C_{oss}		-	41	-		
Reverse transfer capacitance	C_{rss}		-	2	-		
Gate resistance	R_g	$f = 1\text{MHz}$	-	2.8	-	Ω	
Switching characteristics ^[5]							
Total gate charge	Q_g	$V_{DS} = 50V, V_{GS} = 10V, I_D = 4A$	-	10	-	nC	
Gate-source charge	Q_{gs}		-	3	-		
Gate-drain charge	Q_{gd}		-	2	-		
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 250V, V_{GS} = 10V,$ $R_G = 10\Omega, I_D = 10A$	-	7	-	ns	
Turn-on rise time	t_r		-	5	-		
Turn-off delay time	$t_{d(off)}$		-	13	-		
Turn-off fall time	t_f		-	5	-		
Drain-Source Diode Characteristics							
Drain-source diode forward voltage ^[4]	V_{SD}	$V_{GS} = 0V, I_S = 4A$	-	-	1.2	V	
Maximum continuous drain-source diode forward current ^[1]	I_S		-	-	4	A	
Maximum pulsed drain-source diode forward current ^{[1][2]}	I_{SM}		-	-	16	A	
Reverse recovery time	t_{rr}	$dI/dt = 100A/\mu\text{s}, I_S = 10A,$ $V_{DD} = 50V$	-	196	-	ns	
Reverse recovery charge	Q_{rr}		-	1131	-	nC	

Notes :

- $T_C=25^{\circ}\text{C}$ Limited only by maximum temperature allowed.
- $P_W \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$.
- EAS condition: $V_{DD}=50V, V_{GS}=10V, L=10\text{mH}, R_g=25\Omega$, Starting $T_J = 25^{\circ}\text{C}$.
- Pulse Test : Pulse Width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production.
- The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_a=25^{\circ}\text{C}$.

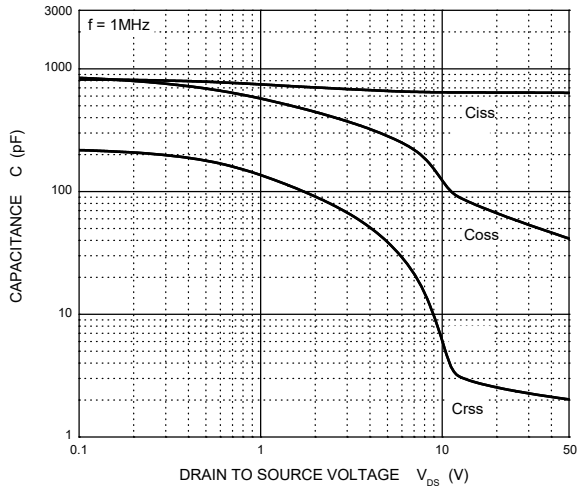


Typical Characteristics

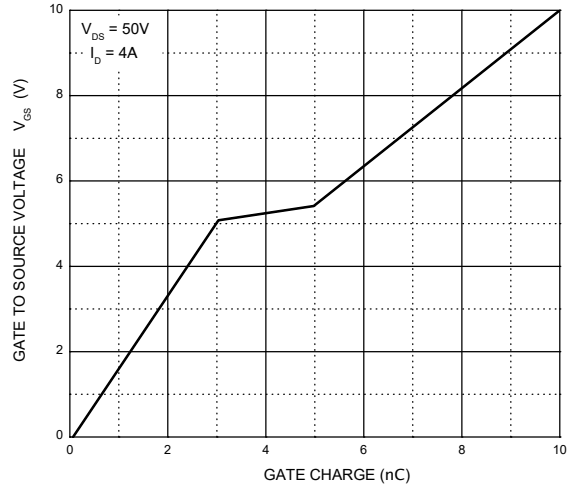




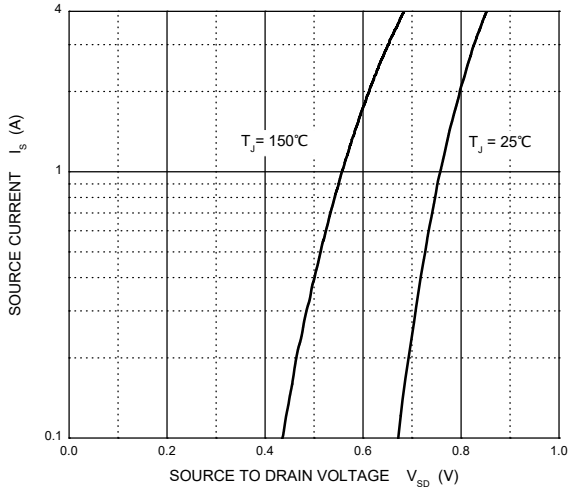
Typical Capacitances



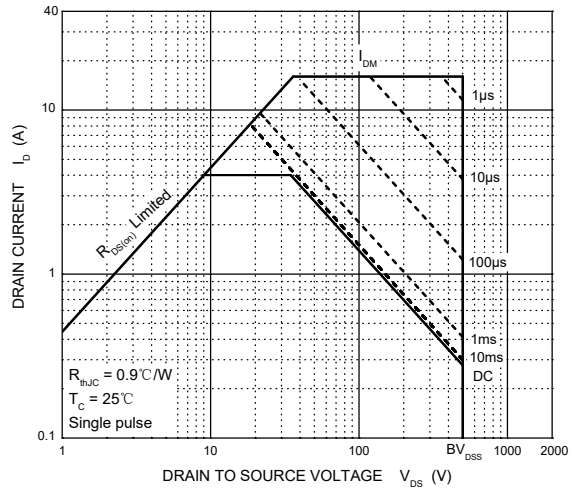
Gate Charge



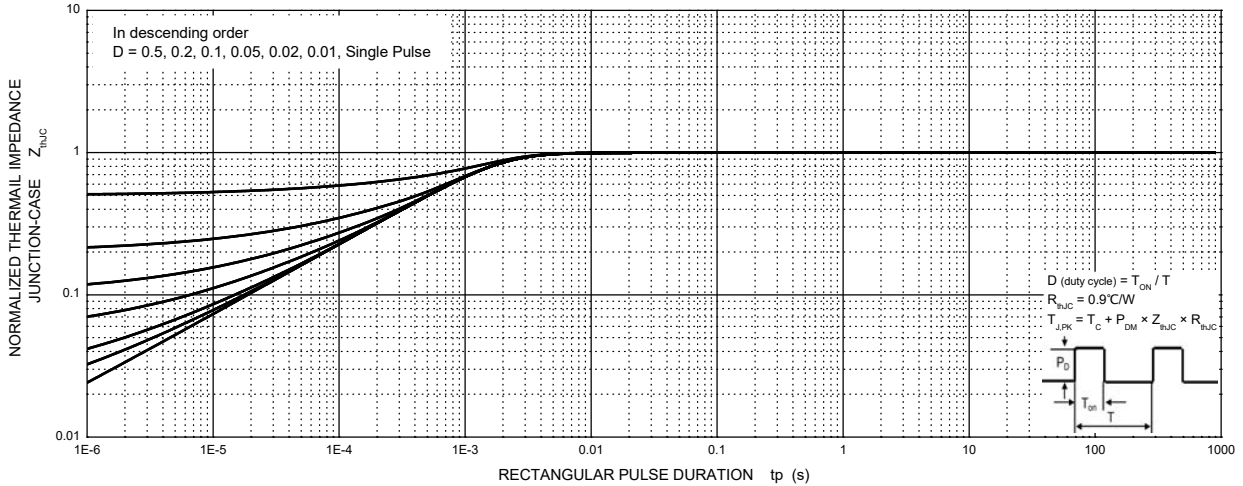
Source-Drain Diode Forward Characteristics



Maximum Safe Operating Area

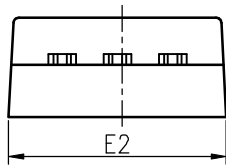
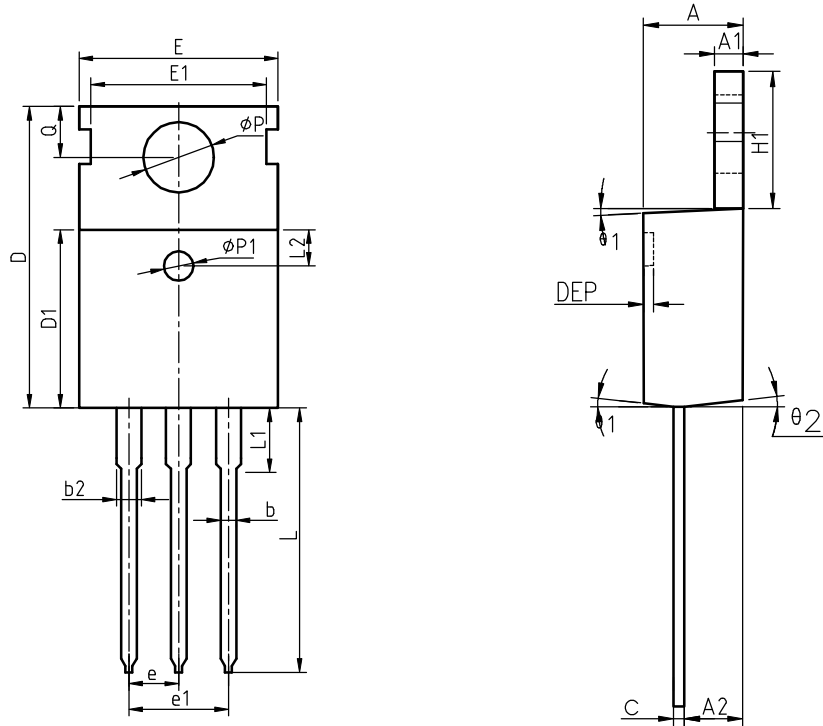


Transient Thermal Impedance, Junction-Case





Package Information
TO-220C



COMMON DIMENSIONS

SYMBOL	MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.57	4.70	0.173	0.180	0.185
A1	1.27	1.30	1.33	0.050	0.051	0.052
A2	2.35	2.40	2.50	0.093	0.094	0.098
b	0.77	0.80	0.90	0.030	0.031	0.035
b2	1.17	1.27	1.36	0.046	0.050	0.054
c	0.48	0.50	0.56	0.019	0.020	0.022
D	15.40	15.60	15.80	0.606	0.614	0.622
D1	9.00	9.10	9.20	0.354	0.358	0.362
DEP	0.05	0.10	0.20	0.002	0.004	0.008
E	9.80	10.00	10.20	0.386	0.394	0.402
E1	-	8.70	-	-	0.343	-
E2	9.80	10.00	10.20	0.386	0.394	0.402
e		2.54	BSC		0.100	BSC
e1		5.08	BSC		0.200	BSC
H1	6.40	6.50	6.60	0.252	0.256	0.260
L	12.75	13.50	13.65	0.502	0.531	0.537
L1	-	3.10	3.30	-	0.122	0.130
L2		2.50	REF		0.098	REF
P	3.50	3.60	3.63	0.138	0.142	0.143
P1	3.50	3.60	3.63	0.138	0.142	0.143
Q	2.73	2.80	2.87	0.107	0.110	0.113
theta 1	5°	7°	9°	5°	7°	9°
theta 2	1°	3°	5°	1°	3°	5°
theta 3	1°	3°	5°	1°	3°	5°



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