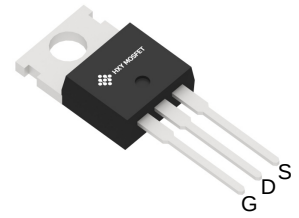




Description

The PHP20NQ20T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



TO-220C

General Features

$V_{DS} = 200V$ $I_D = 18A$

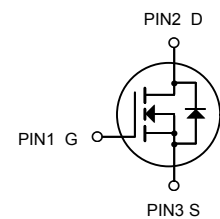
$R_{DS(ON)} < 0.15m\Omega @ V_{GS}=10V$

Application

Battery protection

Load switch

Uninterruptible power supply



N-Channel MOSFET

Ordering Information

Product ID	Pack	Brand	Qty(PCS)
PHP20NQ20T	TO-220C	HXY MOSFET	50

Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	200	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current $T_C=25^\circ C$	18	A
I_D	Continuous Drain Current $T_C=100^\circ C$	11	A
I_{DM}	Pulsed Drain Current note1	72	A
EAS	Single Pulse Avalanche Energy ³	340	mJ
$P_D @ T_C=25^\circ C$	Total Power Dissipation ⁴	63.7	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62.5	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Ambient ¹	1.96	$^\circ C/W$



Electrical Characteristics ($T_c=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	200	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=200V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	-	-	5	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note3	$V_{GS}=10V, I_D=9A$	-	0.12	0.15	Ω
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$	-	1318	-	pF
C_{oss}	Output Capacitance		-	180	-	pF
C_{rss}	Reverse Transfer Capacitance		-	75	-	pF
Q_g	Total Gate Charge	$V_{DD}=160V, I_D=18A, V_{GS}=10V$	-	41	-	nC
Q_{gs}	Gate-Source Charge		-	5.5	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	19.5	-	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=100V, I_D=18A, R_G=25\Omega$	-	24	-	ns
t_r	Turn-on Rise Time		-	45	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	101	-	ns
t_f	Turn-off Fall Time		-	95	-	ns
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	18	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	72	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_{SD}=18A$	-	-	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=18A, di/dt=100A/\mu s$	-	230	-	ns
Q_{rr}	Reverse Recovery Charge		-	1.8	-	μC

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. $I_{AS}=15A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$

3. Pulse Test: Pulse Width $\leq 325\mu s$, Duty Cycle $\leq 1\%$



Typical Performance Characteristics

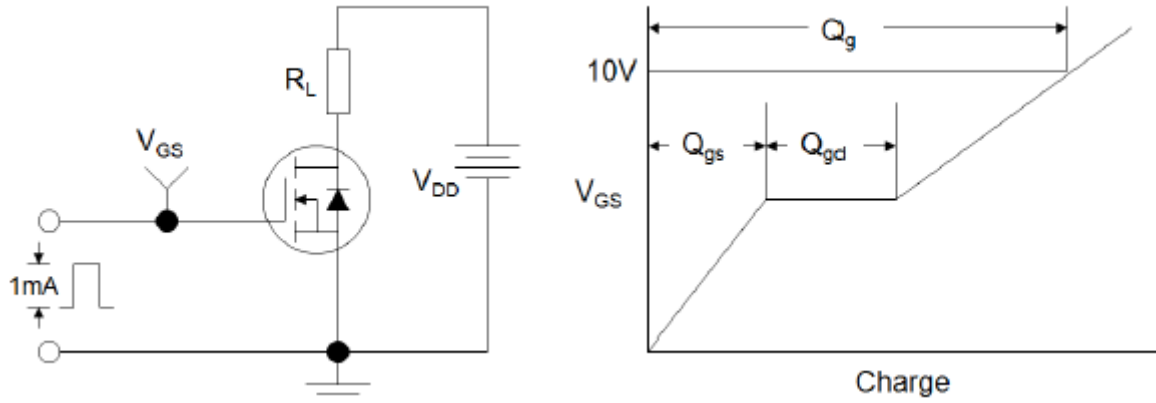


Figure1:Gate Charge Test Circuit & Waveform

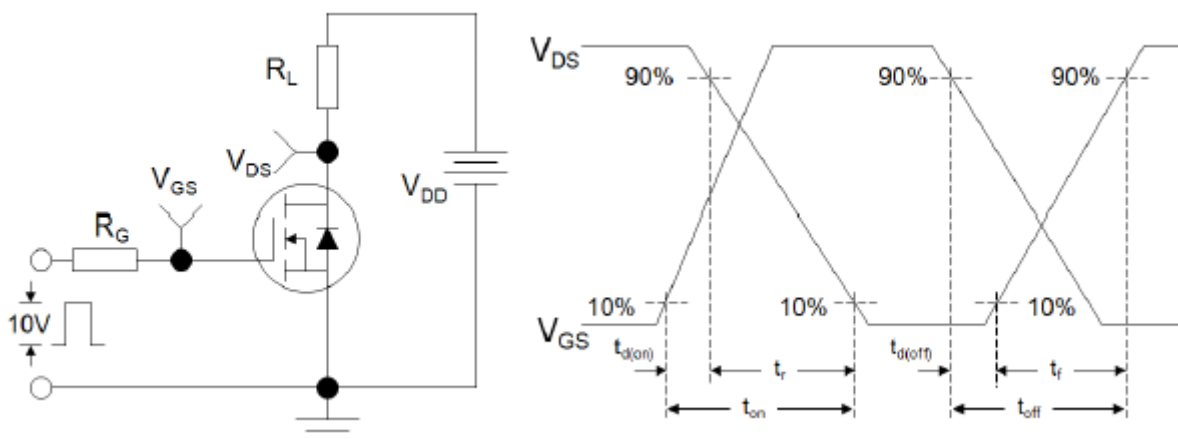


Figure 2: Resistive Switching Test Circuit & Waveforms

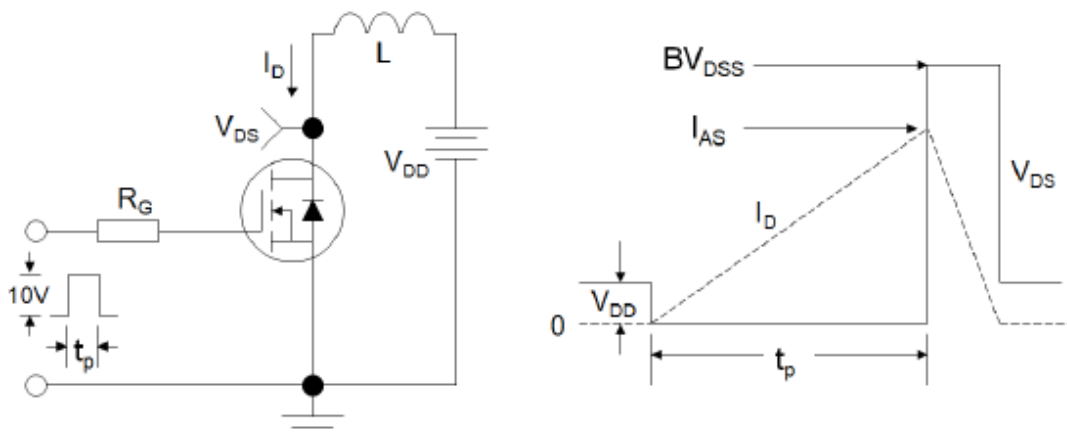


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

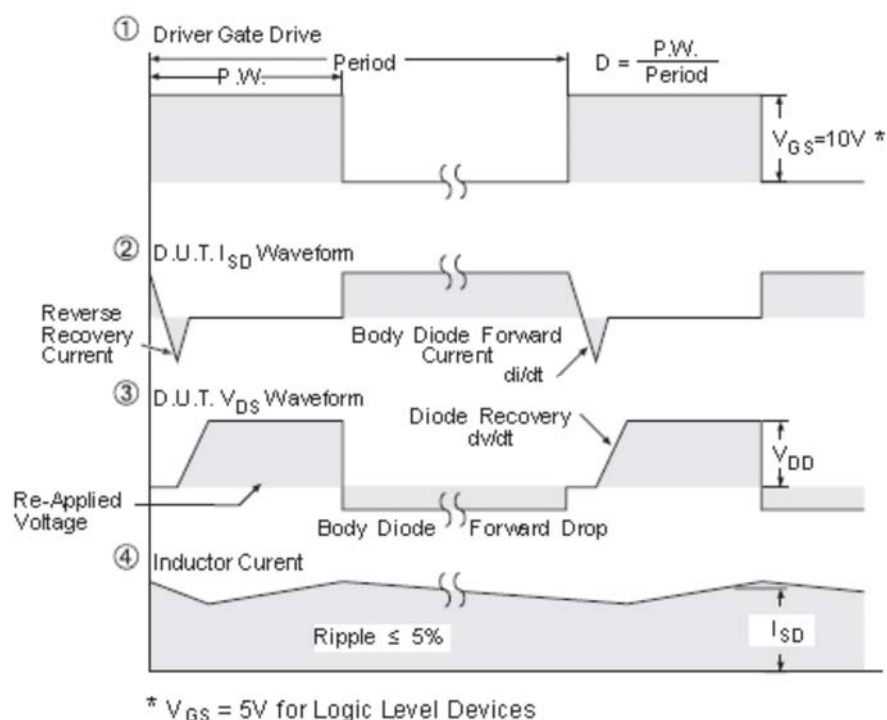
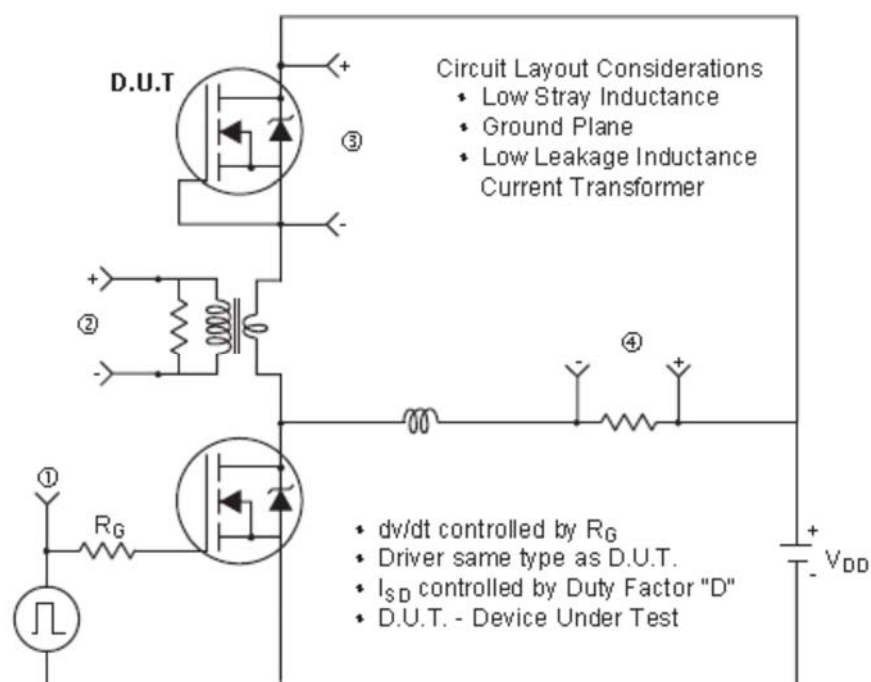
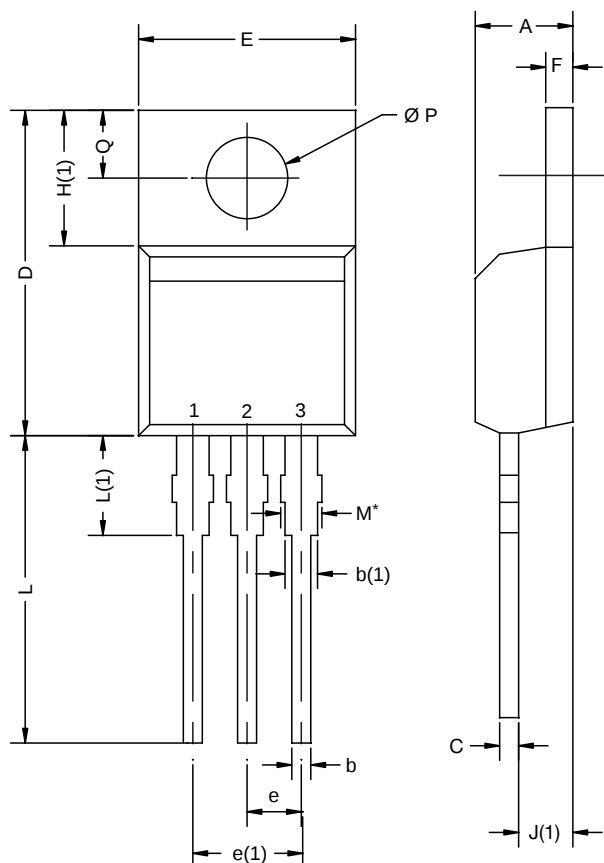


Figure 4: Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)



Package Information

TO-220C



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

Notes

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM



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