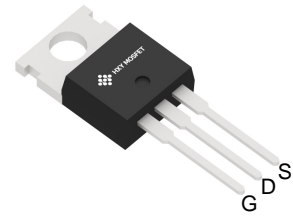




Description

The PHP20NQ20T,127 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

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

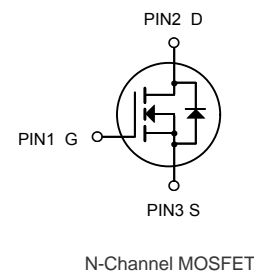
$R_{DS(ON)} < 0.15m\Omega @ V_{GS}=10V$

Application

Battery protection

Load switch

Uninterruptible power supply



Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|----------------|---------|------------|----------|
| PHP20NQ20T,127 | 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 |
| IDM | Pulsed Drain Current note ¹ | 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 <small>note3</small> | $V_{GS}=10V, I_D=9A$ | - | 0.12 | 0.15 | Ω |
| C_{iss} | Input Capacitance | $V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$ | - | 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. $I_{AS}=15A, V_{DD}=50V, R_G=25\Omega, \text{Starting } T_J=25^\circ\text{C}$

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



Typical Performance Characteristics

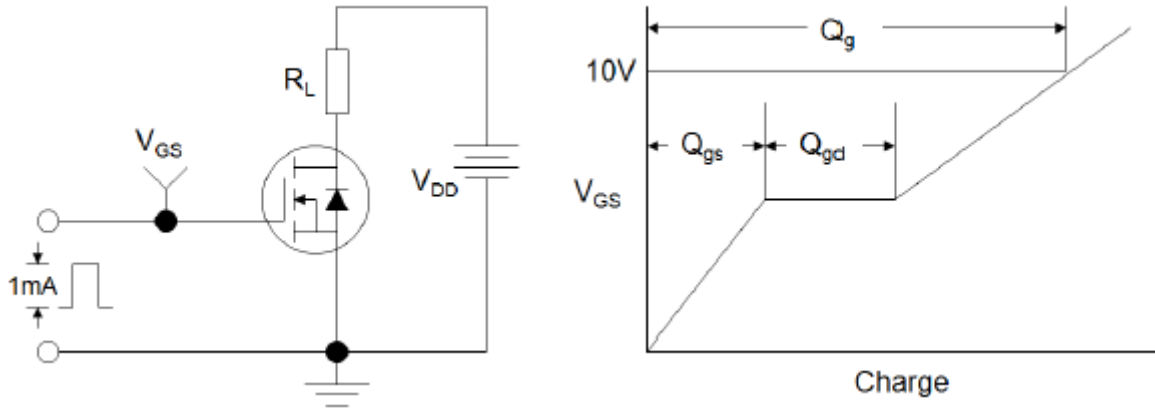


Figure1:Gate Charge Test Circuit & Waveform

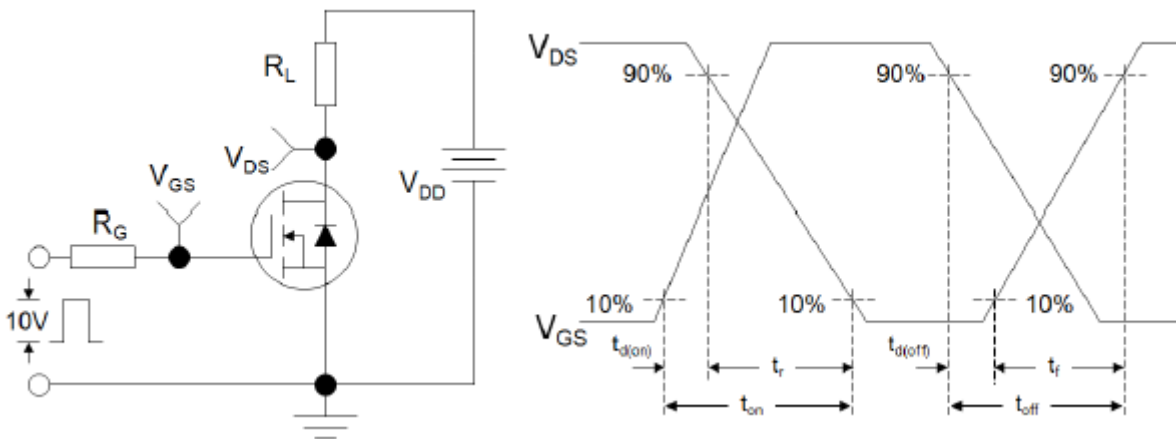


Figure 2: Resistive Switching Test Circuit & Waveforms

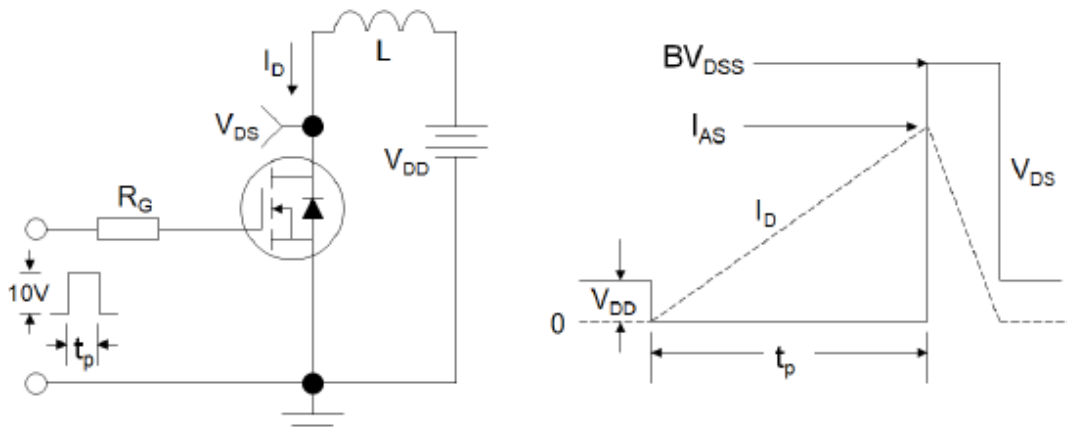


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

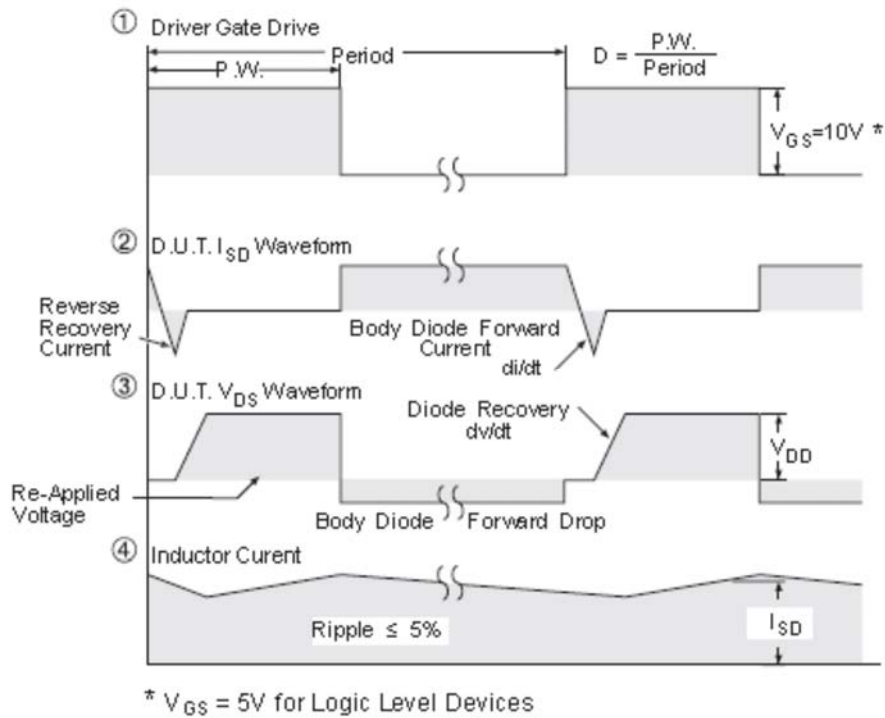
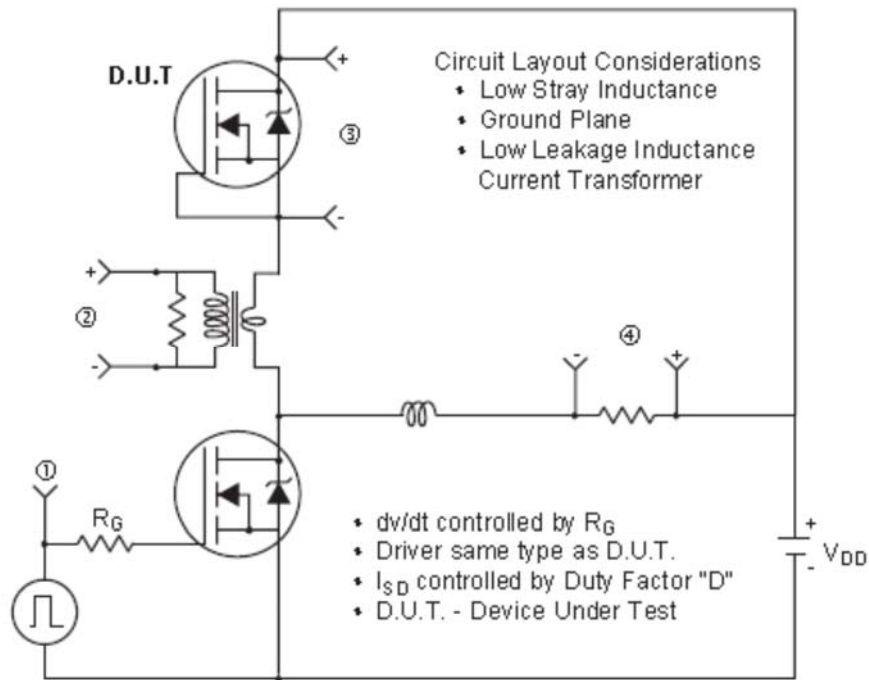
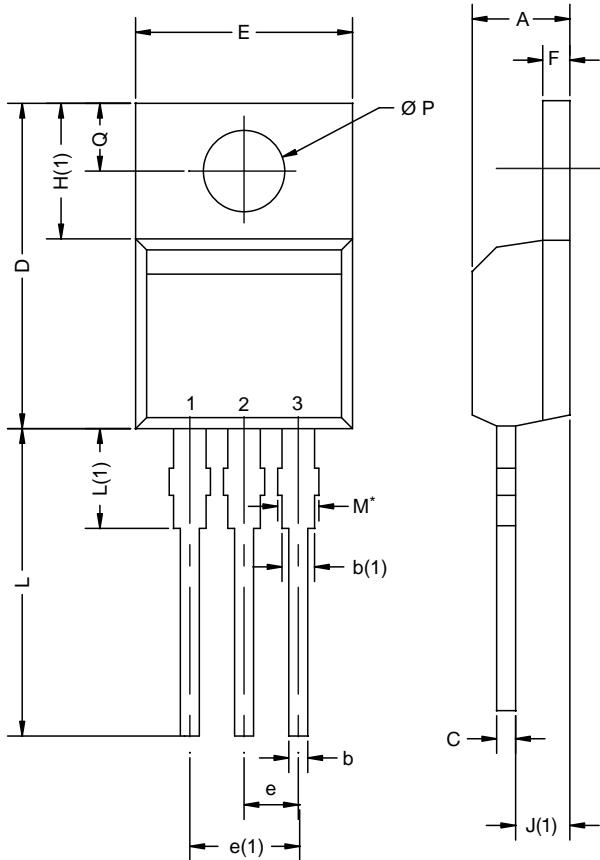


Figure 4: Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)



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 |
| $\varnothing P$ | 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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