

## -30V, -60A P-CHANNEL POWER MOSFET

### GENERAL DESCRIPTION

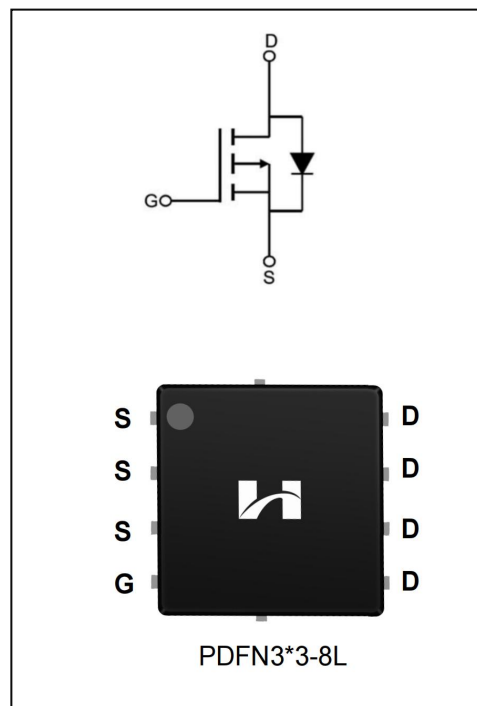
The SFN3006PT use advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge. It can be used in a wide variety applications.

### Features

- ◆  $V_{DS} = -30V$ ,  $I_D = -60A$
- ◆  $R_{DS(on)}$   
TYP:  $5.5m\Omega @ V_{GS} = -10V$   $I_D = -30A$   
MAX:  $7.5m\Omega$

### Applications

- ◆ Power faction correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



### ORDERING INFORMATION

| Part No.  | Package    | Marking   | Material | Packing |
|-----------|------------|-----------|----------|---------|
| SFN3006PT | PDFN3*3-8L | SFN3006PT | Pb free  | Reel    |

**ABSOLUTE MAXIMUM RATINGS** ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

| Characteristics                                                                     |                             | Symbol    | Ratings       | Unit               |
|-------------------------------------------------------------------------------------|-----------------------------|-----------|---------------|--------------------|
| Drain-Source Voltage                                                                |                             | $V_{DS}$  | -30           | V                  |
| Gate-Source Voltage                                                                 |                             | $V_{GS}$  | $\pm 20$      | V                  |
| Drain Current                                                                       | $T_C = 25^{\circ}\text{C}$  | $I_D$     | -60           | A                  |
|                                                                                     | $T_C = 100^{\circ}\text{C}$ |           | -40           |                    |
| Drain Current Pulsed (Note 1)                                                       |                             | $I_{DM}$  | -320          | A                  |
| Power Dissipation( $T_C=25^{\circ}\text{C}$ )<br>-Derate above $25^{\circ}\text{C}$ |                             | $P_D$     | 49            | W                  |
| Operation Junction Temperature Range                                                |                             | $T_J$     | $-55\sim+150$ | $^{\circ}\text{C}$ |
| Storage Temperature Range                                                           |                             | $T_{stg}$ | $-55\sim+150$ | $^{\circ}\text{C}$ |
| Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds       |                             | $TL$      | 300           | $^{\circ}\text{C}$ |

**THERMAL CHARACTERISTICS**

| Characteristics                         | Symbol          | MAX | Unit                 |
|-----------------------------------------|-----------------|-----|----------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 4.4 | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 75  | $^{\circ}\text{C/W}$ |

**ELECTRICAL CHARACTERISTICS**

| Characteristics                          | Symbol              | Test conditions                                                                                              | Min. | Typ. | Max. | Unit |
|------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------|------|------|------|------|
| Off Characteristics                      |                     |                                                                                                              |      |      |      |      |
| Drain -Source Breakdown Voltage          | B <sub>VDSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                                                  | -30  | --   | --   | V    |
| Drain-Source Leakage Current             | I <sub>DSS</sub>    | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V                                                                   | --   | --   | 1    | uA   |
| Gate-Source Leakage Current              | I <sub>GSS</sub>    | V <sub>GS</sub> =20V, V <sub>DS</sub> =0V                                                                    | --   | --   | 100  | nA   |
| Gate-Source Leakage Current              | I <sub>GSS</sub>    | V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V                                                                   | --   | --   | -100 |      |
| On Characteristics                       |                     |                                                                                                              |      |      |      |      |
| Gate Threshold Voltage                   | V <sub>GS(th)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> =-250μA                                                   | -1.0 | -1.5 | -2.5 | V    |
| Static Drain- Source On State Resistance | R <sub>DS(on)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-20A                                                                 | --   | 8.5  | 12   | mΩ   |
|                                          | R <sub>DS(on)</sub> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-30A                                                                  | --   | 5.5  | 7.5  |      |
| Dynamic Characteristics                  |                     |                                                                                                              |      |      |      |      |
| Gate Resistance                          | R <sub>g</sub>      | V <sub>GS</sub> =0V; f=1.0MHZ                                                                                | 1    | 6    | 10   | Ω    |
| Input Capacitance                        | C <sub>iss</sub>    | V <sub>DS</sub> =-15V<br><br>V <sub>GS</sub> =0<br><br>f=1.0MHZ                                              | --   | 4150 | --   | pF   |
| Output Capacitance                       | C <sub>oss</sub>    |                                                                                                              | --   | 523  | --   |      |
| Reverse Transfer Capacitance             | C <sub>rss</sub>    |                                                                                                              | --   | 476  | --   |      |
| Switching Characteristics                |                     |                                                                                                              |      |      |      |      |
| Turn-on Delay Time                       | t <sub>d(on)</sub>  | V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V<br>R <sub>G</sub> =3.0Ω, I <sub>D</sub> =-15A<br><br>(Note 2.3) | --   | 17.6 | --   | ns   |
| Turn-on Rise Time                        | t <sub>r</sub>      |                                                                                                              | --   | 13.4 | --   |      |
| Turn-off Delay Time                      | t <sub>d(off)</sub> |                                                                                                              | --   | 71.1 | --   |      |
| Turn-off Fall Time                       | t <sub>f</sub>      |                                                                                                              | --   | 31.2 | --   |      |

|                    |          |                                                        |    |      |    |    |
|--------------------|----------|--------------------------------------------------------|----|------|----|----|
| Total Gate Charge  | $Q_g$    | $V_{DS}=-15V, I_D=-25A$<br>$V_{GS}=-10V$<br>(Note 2.3) | -- | 44.6 | -- | nc |
| Gate-Source Charge | $Q_{gs}$ |                                                        | -- | 7.7  | -- |    |
| Gate-Drain Charge  | $Q_{gd}$ |                                                        | -- | 11.8 | -- |    |

**SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS**

| Characteristics           | Symbol   | Test conditions                                         | Min. | Typ.  | Max. | Unit |
|---------------------------|----------|---------------------------------------------------------|------|-------|------|------|
| Continuous Source Current | $I_S$    | Integral Reverse P-N<br>Junction Diode in the<br>MOSFET | --   | --    | -60  | A    |
| Pulsed Source Current     | $I_{SM}$ |                                                         | --   | --    | -320 |      |
| Diode Forward Voltage     | $V_{SD}$ | $I_S=-30A, V_{GS}=0V$                                   | --   | -0.89 | 1.4  | V    |

- 1.Pulse width limited by maximum junction temperature
- 2.Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
- 3.Essentially independent of operating temperature

## Typical Performance Characteristics

Figure 1. Output Characteristics

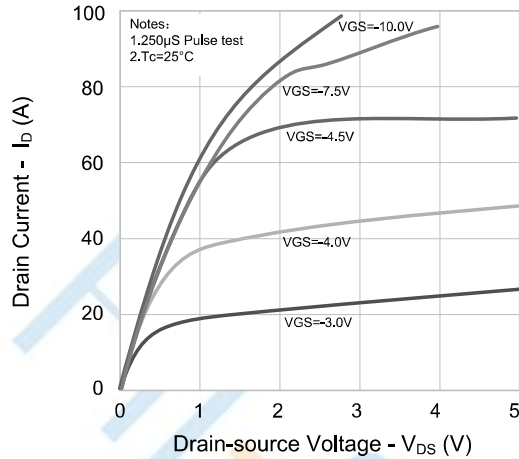


Figure 2. Transfer Characteristics

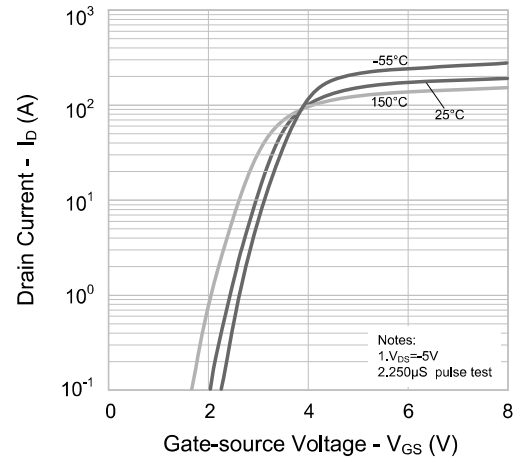


Figure 3. On-Resistance vs. Drain Current

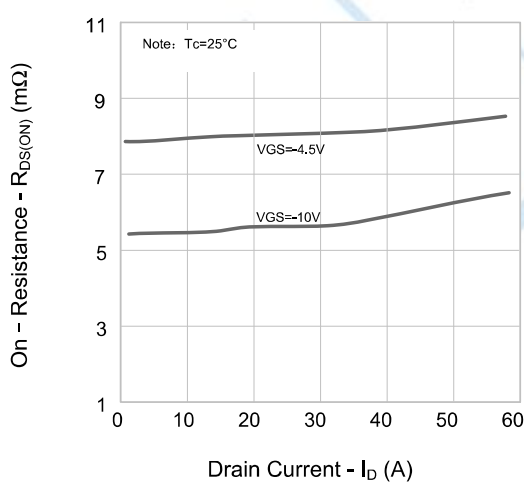


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

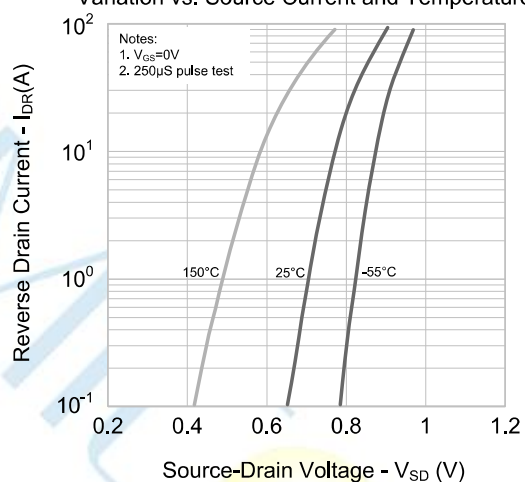


Figure 5. Capacitance Characteristics

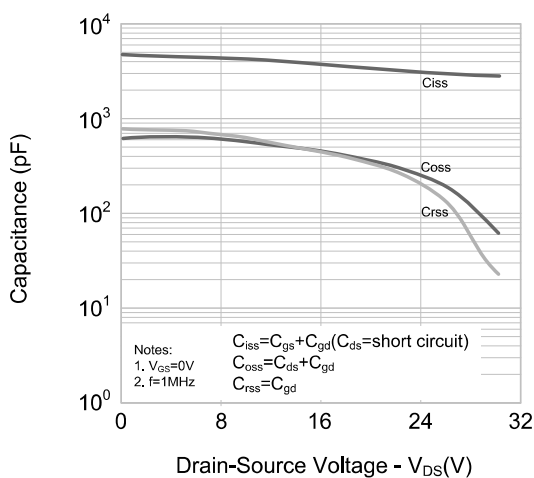
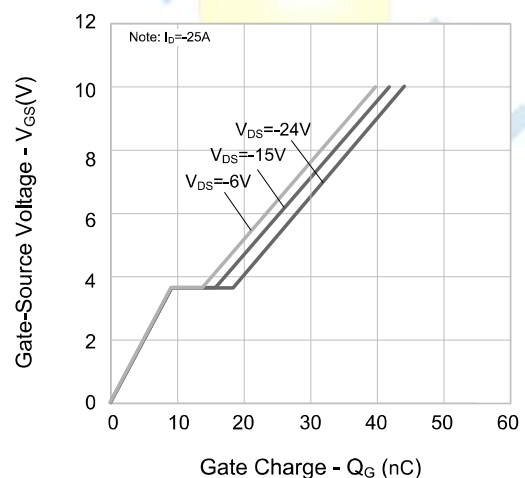


Figure 6. Gate Charge



## Typical Performance Characteristics

Figure 7. Breakdown Voltage vs. Temperature Characteristics

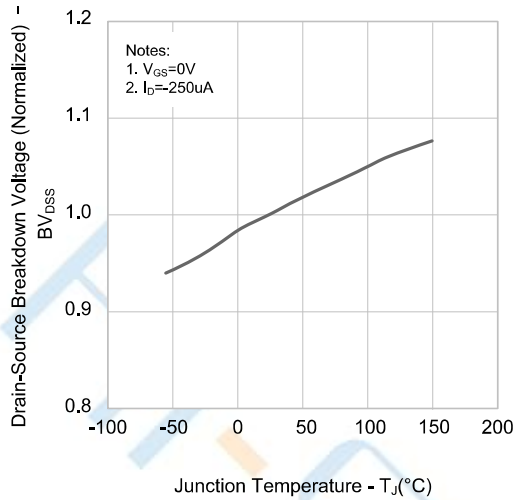


Figure 8. On-Resistance vs. Temperature Characteristics

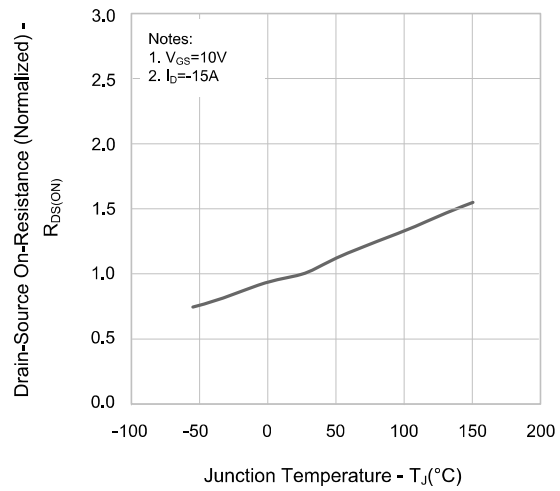
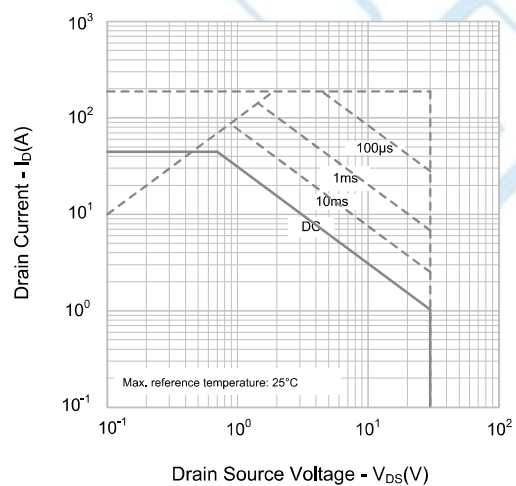
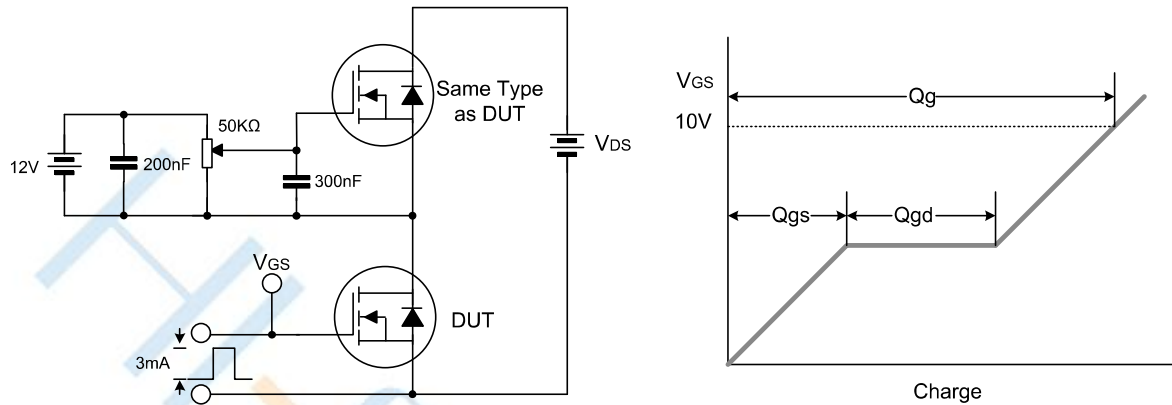


Figure 9. Max. Safe Operating Area

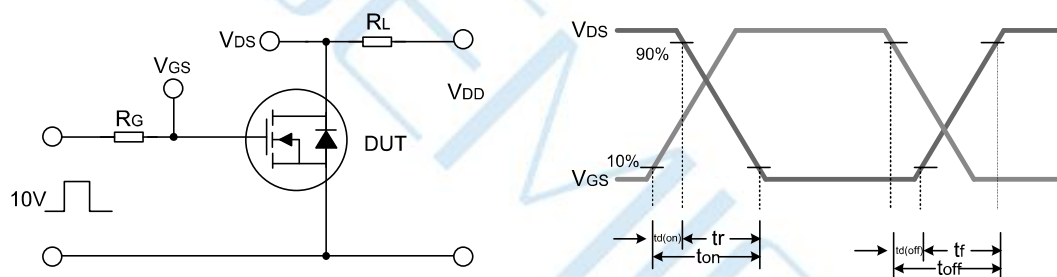


## Test Circuit

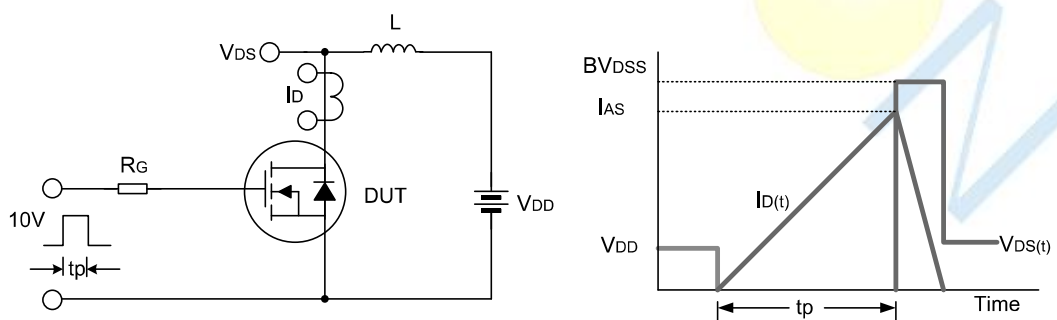
Gate Charge Test Circuit & Waveform



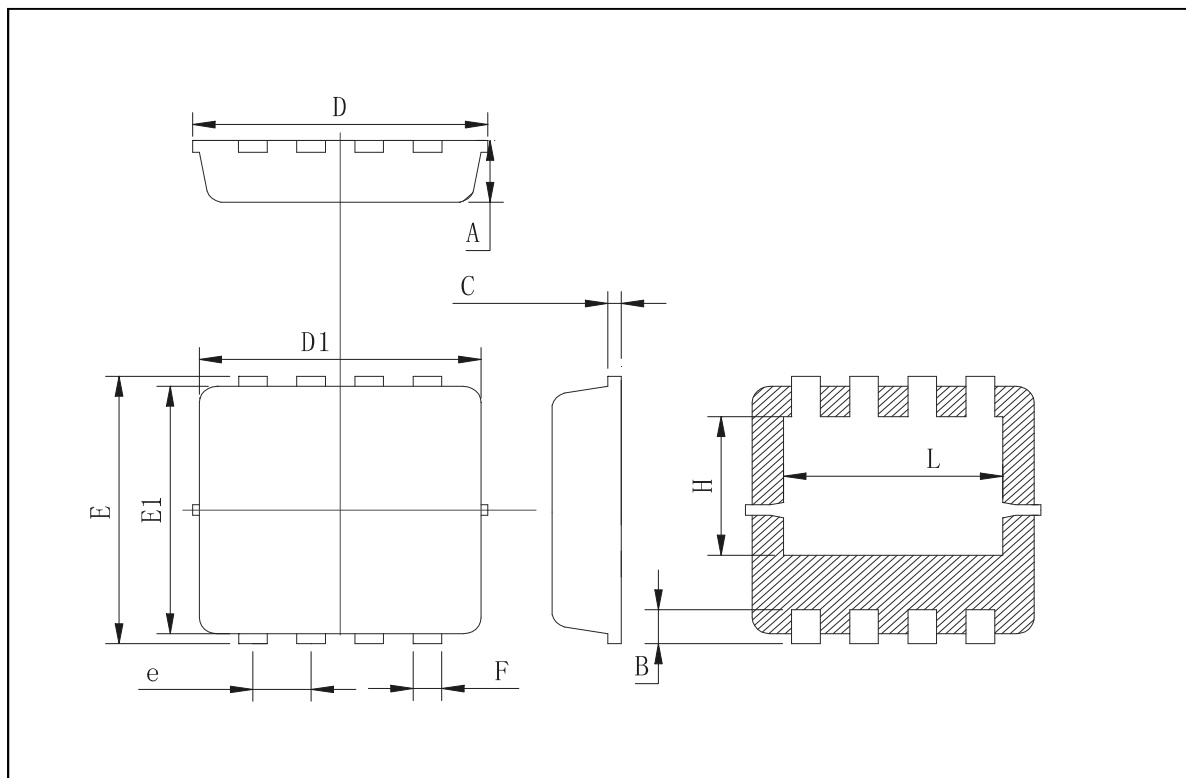
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



## Package Dimensions of PDFN3\*3-8L



Unit:mm

| Symbol | Min   | Typ   | Max   |
|--------|-------|-------|-------|
| A      | 0.725 | 0.775 | 0.825 |
| B      | 0.28  | 0.38  | 0.48  |
| C      | 0.13  | 0.15  | 0.20  |
| D      | 3.20  | 3.30  | 3.35  |
| D1     | 3.05  | 3.15  | 3.25  |
| E      | 3.25  | 3.35  | 3.45  |
| E1     | 3.0   | 3.1   | 3.2   |
| e      | 0.60  | 0.65  | 0.70  |
| F      | 0.27  | 0.32  | 0.37  |
| H      | 1.63  | 1.73  | 1.83  |
| L      | 2.35  | 2.45  | 2.55  |

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