

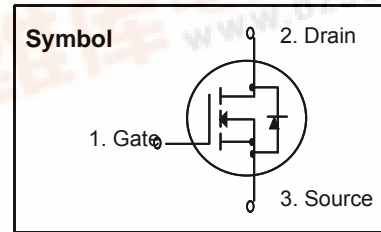
**VFET™**

**WFP7N60**

**N-Channel MOSFET**

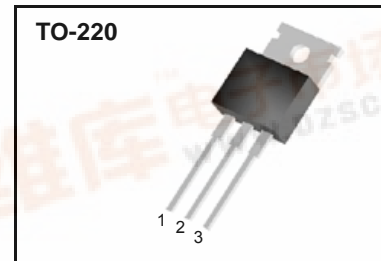
**Features**

- $R_{DS(on)}$  (Max 1.2  $\Omega$ )@ $V_{GS}=10V$
- Gate Charge (Typical 28nC)
- Improved dv/dt Capability, High Ruggedness
- 100% Avalanche Tested
- Maximum Junction Temperature Range (150°C)



**General Description**

This Power MOSFET is produced using Wisdom's advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. These devices are well suited for high efficiency switch mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.



**Absolute Maximum Ratings**

| Symbol         | Parameter  | Value      | Units |
|----------------|--|------------|-------|
| $V_{DSS}$      | Drain to Source Voltage  | 600        | V     |
| $I_D$          | Continuous Drain Current(@ $T_C = 25^\circ C$ )                              | 7.0        | A     |
|                | Continuous Drain Current(@ $T_C = 100^\circ C$ )                             | 4.4        | A     |
| $I_{DM}$       | Drain Current Pulsed (Note 1)  | 28         | A     |
| $V_{GS}$       | Gate to Source Voltage   | $\pm 30$   | V     |
| $E_{AS}$       | Single Pulsed Avalanche Energy (Note 2)                                      | 420        | mJ    |
| $E_{AR}$       | Repetitive Avalanche Energy (Note 1)   | 14.7       | mJ    |
| dv/dt          | Peak Diode Recovery dv/dt (Note 3)   | 4.5        | V/ns  |
| $P_D$          | Total Power Dissipation(@ $T_C = 25^\circ C$ )                               | 147        | W     |
|                | Derating Factor above 25 °C  | 1.18       | W/°C  |
| $T_{STG}, T_J$ | Operating Junction Temperature & Storage Temperature                         | - 55 ~ 150 | °C    |
| $T_L$          | Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds. | 300        | °C    |

**Thermal Characteristics**

| Symbol          | Parameter                               | Value |      |      | Units |
|-----------------|---|-------|------|------|-------|
|                 |   | Min.  | Typ. | Max. |       |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    | -     | -    | 0.85 | °C/W  |
| $R_{\theta CS}$ | Thermal Resistance, Case to Sink        | -     | 0.5  | -    | °C/W  |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | -     | -    | 62.5 | °C/W  |



# WFP7N60

## Electrical Characteristics ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted )

| Symbol                         | Parameter                                 | Test Conditions   | Min | Typ  | Max  | Units               |
|--------------------------------|---|---|-----|------|------|---------------------|
| <b>Off Characteristics</b>     |   |   |     |      |      |                     |
| $BV_{DSS}$                     | Drain-Source Breakdown Voltage            | $V_{GS} = 0V, I_D = 250\mu A$                               | 600 | -    | -    | V                   |
| $\Delta BV_{DSS}/\Delta T_J$   | Breakdown Voltage Temperature coefficient | $I_D = 250\mu A$ , referenced to $25\text{ }^\circ\text{C}$ | -   | 0.6  | -    | V/ $^\circ\text{C}$ |
| $I_{DSS}$                      | Drain-Source Leakage Current              | $V_{DS} = 600V, V_{GS} = 0V$                                | -   | -    | 10   | $\mu A$             |
|                                |   | $V_{DS} = 480V, T_C = 125\text{ }^\circ\text{C}$            | -   | -    | 100  | $\mu A$             |
| $I_{GSS}$                      | Gate-Source Leakage, Forward              | $V_{GS} = 30V, V_{DS} = 0V$                                 | -   | -    | 100  | nA                  |
|                                | Gate-source Leakage, Reverse              | $V_{GS} = -30V, V_{DS} = 0V$                                | -   | -    | -100 | nA                  |
| <b>On Characteristics</b>      |   |   |     |      |      |                     |
| $V_{GS(th)}$                   | Gate Threshold Voltage                    | $V_{DS} = V_{GS}, I_D = 250\mu A$                           | 2.0 | -    | 4.0  | V                   |
| $R_{DS(ON)}$                   | Static Drain-Source On-state Resistance   | $V_{GS} = 10V, I_D = 3.5A$                                  | -   | 1.0  | 1.2  | $\Omega$            |
| <b>Dynamic Characteristics</b> |   |   |     |      |      |                     |
| $C_{iss}$                      | Input Capacitance                         | $V_{GS} = 0V, V_{DS} = 25V, f = 1MHz$                       | -   | 1100 | 1500 | pF                  |
| $C_{oss}$                      | Output Capacitance                        |   | -   | 110  | 150  |                     |
| $C_{rss}$                      | Reverse Transfer Capacitance              |   | -   | 12   | 16   |                     |
| <b>Dynamic Characteristics</b> |   |   |     |      |      |                     |
| $t_{d(on)}$                    | Turn-on Delay Time                        | $V_{DD} = 300V, I_D = 7.0A, R_G = 25\Omega$<br>(Note 4, 5)  | -   | 15   | 40   | ns                  |
| $t_r$                          | Rise Time                                 |   | -   | 30   | 70   |                     |
| $t_{d(off)}$                   | Turn-off Delay Time                       |   | -   | 110  | 230  |                     |
| $t_f$                          | Fall Time                                 |   | -   | 40   | 90   |                     |
| $Q_g$                          | Total Gate Charge                         | $V_{DS} = 480V, V_{GS} = 10V, I_D = 7.0A$<br>(Note 4, 5)    | -   | 28   | 37   | nC                  |
| $Q_{gs}$                       | Gate-Source Charge                        |   | -   | 5    | -    |                     |
| $Q_{gd}$                       | Gate-Drain Charge(Miller Charge)          |   | -   | 11   | -    |                     |

## Source-Drain Diode Ratings and Characteristics

| Symbol   | Parameter                 | Test Conditions                                   | Min. | Typ. | Max. | Unit.   |
|----------|---------------------------|---|------|------|------|---------|
| $I_S$    | Continuous Source Current | Integral Reverse p-n Junction Diode in the MOSFET | -    | -    | 7.0  | A       |
| $I_{SM}$ | Pulsed Source Current     |   | -    | -    | 28   |         |
| $V_{SD}$ | Diode Forward Voltage     | $I_S = 7.0A, V_{GS} = 0V$                         | -    | -    | 1.4  | V       |
| $t_{rr}$ | Reverse Recovery Time     | $I_S = 7.0A, V_{GS} = 0V, di/dt = 100A/\mu s$     | -    | 365  | -    | ns      |
| $Q_{rr}$ | Reverse Recovery Charge   |   | -    | 3.4  | -    | $\mu C$ |

### ※ NOTES

1. Repeativity rating : pulse width limited by junction temperature
2.  $L = 15.7mH, I_{AS} = 7A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3.  $I_{SD} \leq 7A, di/dt \leq 200A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$
5. Essentially independent of operating temperature.



## Typical Characteristics

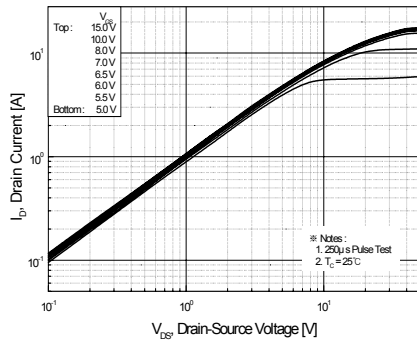


Figure 1. On-Region Characteristics

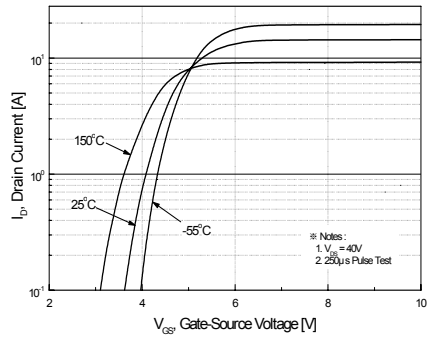


Figure 2. Transfer Characteristics

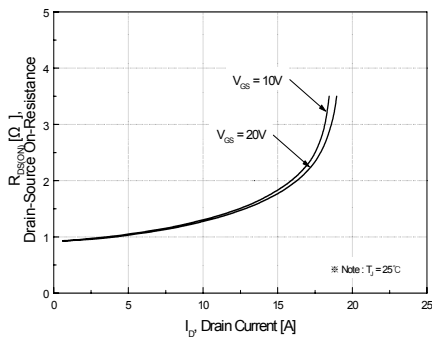


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

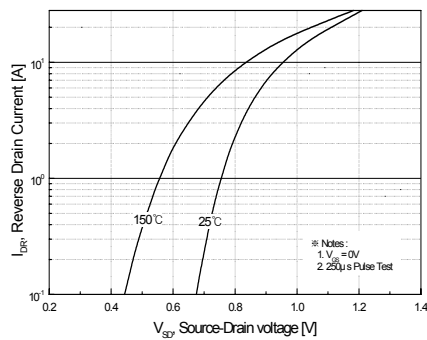


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

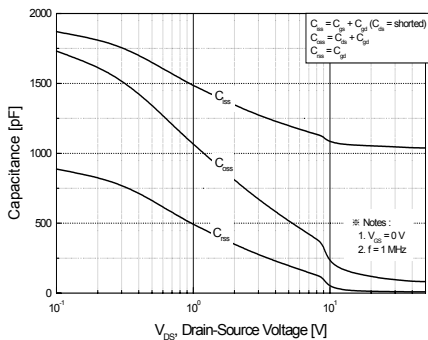


Figure 5. Capacitance Characteristics

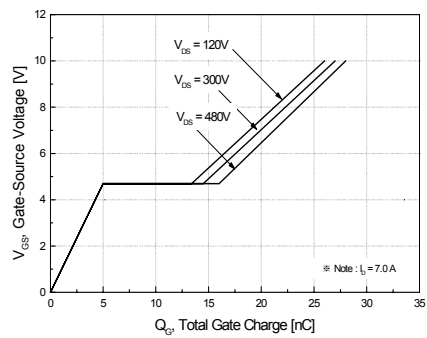
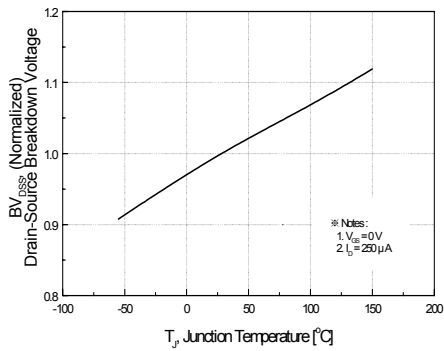
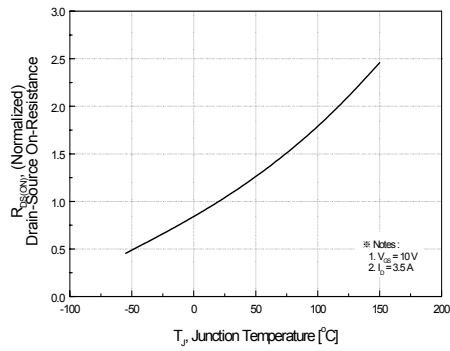


Figure 6. Gate Charge Characteristics

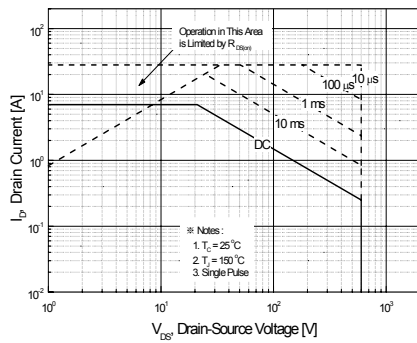
## Typical Characteristics (Continued)



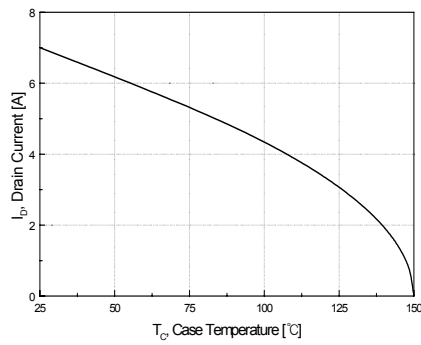
**Figure 7. Breakdown Voltage Variation vs Temperature**



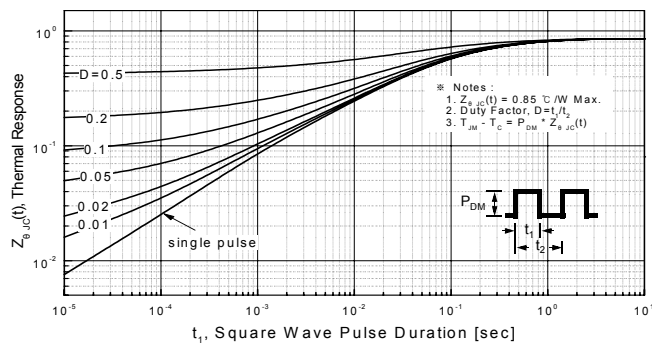
**Figure 8. On-Resistance Variation vs Temperature**



**Figure 9. Maximum Safe Operating Area**



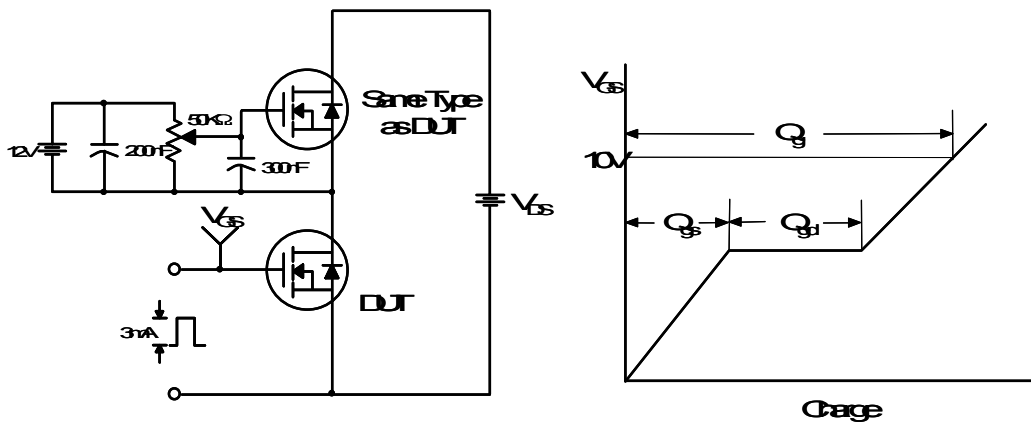
**Figure 10. Maximum Drain Current vs Case Temperature**



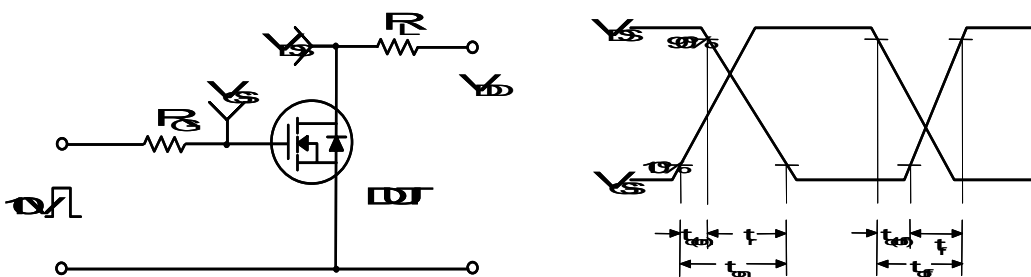
**Figure 11. Transient Thermal Response Curve**



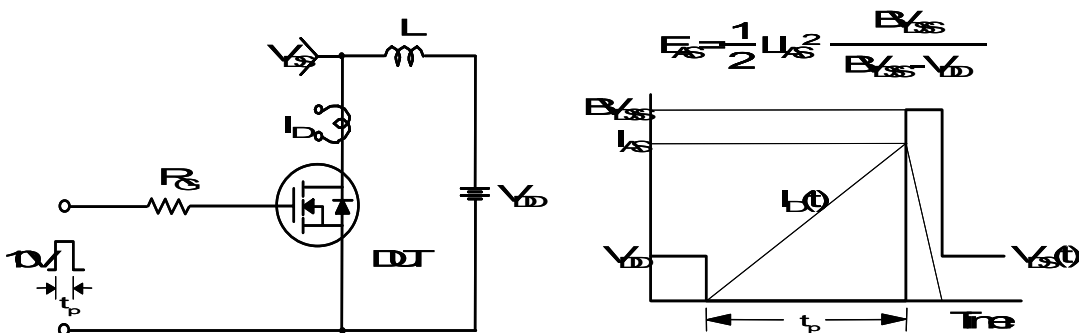
Gate Charge Test Circuit & Waveform



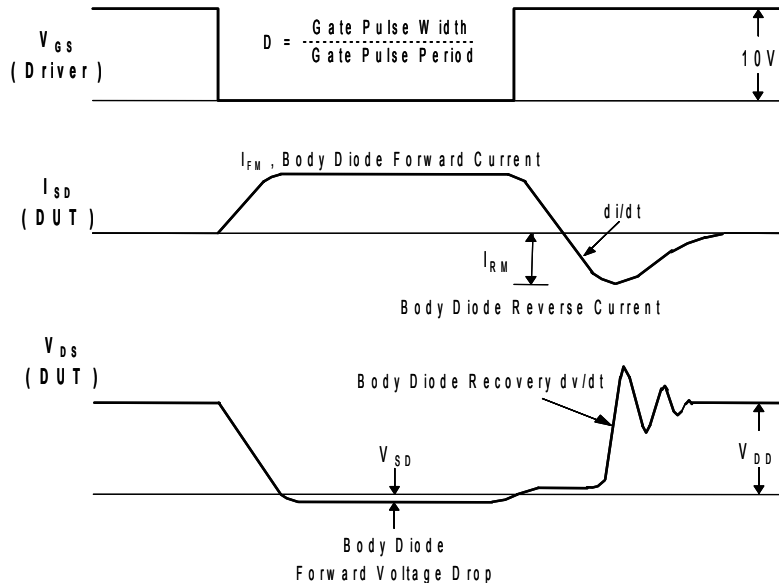
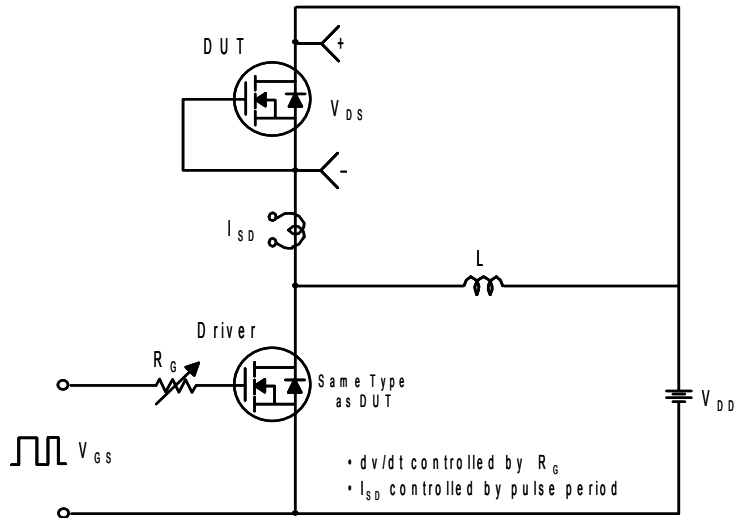
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



### Peak Diode Recovery dv/dt Test Circuit & Waveforms



# Package Dimensions

## TO-220

