



## 800V N-Channel Power MOSFET

### FEATURES

- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

| Parameters Summary  |   |
|---|---|
| VDS: 800V   | ID (at VGS=10V): 50A Rds(on) (at VGS=10V): 120mΩ(Typ.)                                    |
|  |  SOT-227 |

| Device Ordering Marking Packing Information |         |            |         |
|---|---------|------------|---------|
| Ordering Number                             | Package | Marking    | Packing |
| XBP50N80FX                                  | SOT-227 | XBP50N80FX | Tube    |



### Absolute Maximum Ratings $i_C = 25^{\circ}\text{C}$ , unless otherwise noted

| Parameter  | Symbol         | Value    | Unit               |
|--|----------------|----------|--------------------|
| Drain-Source Voltage ( $V_{GS} = 0\text{V}$ )    | $V_{DSS}$      | 800      | V                  |
| Continuous Drain Current                         | $I_D$          | 50       | A                  |
| Pulsed Drain Current (note1)                     | $I_{DM}$       | 200      | A                  |
| Gate-Source Voltage                              | $V_{GSS}$      | $\pm 30$ | V                  |
| Single Pulse Avalanche Energy (note2)            | $E_{AS}$       | 4500     | mJ                 |
| Repetitive Avalanche Energy (note1)              | $E_{AR}$       | 60       | mJ                 |
| Power Dissipation ( $T_C = 25^{\circ}\text{C}$ ) | $P_D$          | 690      | W                  |
| Operating Junction and Storage Temperature Range | $T_J, T_{stg}$ | -55~+150 | $^{\circ}\text{C}$ |

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

### Thermal Resistance

| Parameter                               | Symbol          | Value | Unit                 |
|---|-----------------|-------|----------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 0.18  | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 40    |                      |

**Specifications  $T_J = 25^\circ\text{C}$ , unless otherwise noted**

| Parameter                                      | Symbol        | Test Conditions  | Value |       |           | Unit       |
|--|---------------|--|-------|-------|-----------|------------|
|  |               |  | Min.  | Typ.  | Max.      |            |
| <b>Static</b>                                  |               |  |       |       |           |            |
| Drain-Source Breakdown Voltage                 | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                            | 800   | --    | --        | V          |
| Zero Gate Voltage Drain Current                | $I_{DSS}$     | $V_{DS} = 800, V_{GS} = 0V, T_J = 25^\circ\text{C}$      | --    | --    | 1.0       | $\mu A$    |
| Gate-Source Leakage                            | $I_{GSS}$     | $V_{GS} = \pm 30V$                                       | --    | --    | $\pm 100$ | nA         |
| Gate-Source Threshold Voltage                  | $V_{GS(th)}$  | $I_D = 250\mu A, V_{DS} = 800V$                          | 2.5   | 2.5   | 2.5       | V          |
| Drain-Source On-Resistance (Note3)             | $R_{DS(on)}$  | $V_{GS} = 10V, I_D = 25A$                                | --    | 120   | 130       | m $\Omega$ |
| <b>Dynamic</b>                                 |               |  |       |       |           |            |
| Input Capacitance                              | $C_{iss}$     | $V_{GS} = 0V,$<br>$V_{DS} = 25V,$<br>$f = 1.0\text{MHz}$ | --    | 14600 | --        | pF         |
| Output Capacitance                             | $C_{oss}$     |  | --    | 1300  | --        |            |
| Reverse Transfer Capacitance                   | $C_{rss}$     |  | --    | 66    | --        |            |
| Total Gate Charge                              | $Q_g$         | $V_{DD} = 100V, I_D = 50A, V_{GS} = 10V$                 | --    | 360   | --        | nC         |
| Gate-Source Charge                             | $Q_{gs}$      |  | --    | 120   | --        |            |
| Gate-Drain Charge                              | $Q_{gd}$      |  | --    | 120   | --        |            |
| Turn-on Delay Time                             | $t_{d(on)}$   | $V_{DD} = 100V, V_{GS} = 10V, R_G = 10\Omega$            | --    | 110   | --        | ns         |
| Turn-on Rise Time                              | $t_r$         |  | --    | 200   | --        |            |
| Turn-off Delay Time                            | $t_{d(off)}$  |  | --    | 160   | --        |            |
| Turn-off Fall Time                             | $t_f$         |  | --    | 185   | --        |            |
| <b>Drain-Source Body Diode Characteristics</b> |               |  |       |       |           |            |
| Continuous Body Diode Current                  | $I_{S}$       | $V_{GS} = 0V$  | --    | --    | 50        | A          |
| Pulsed Diode Forward Current                   | $I_{SM}$      | $V_{GS} = 0V$  | --    | --    | 400       | A          |
| Body Diode Voltage                             | $V_{SD}$      | $T_J = 25^\circ\text{C}, I_{SD} = 25A, V_{GS} = 0V$      | --    | --    | 1.4       | V          |
| Reverse Recovery Time                          | $t_{rr}$      | $V_{GS} = 0V, I_{SD} = 25A, di/dt = 100A/\mu s$          | --    | 520   | --        | ns         |
| Reverse Recovery Charge                        | $Q_{rr}$      | $V_{GS} = 0V, I_{SD} = 25A, di/dt = 100A/\mu s$          | --    | 5.0   | --        | $\mu C$    |

**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
3. Pulse Test: Pulse width  $\leq 300\mu s$ , Duty Cycle  $\leq 1\%$

Figure 1. Maximum Transient Thermal Impedance

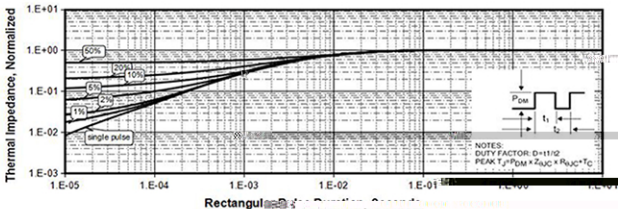


Figure 2. Maximum Power Dissipation vs  $T_c$

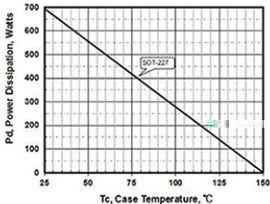


Figure 3. Maximum Continuous Drain Current vs  $T_c$

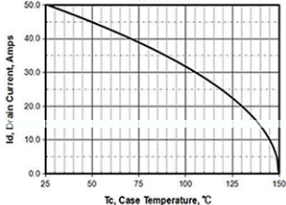


Figure 4. Output Characteristics

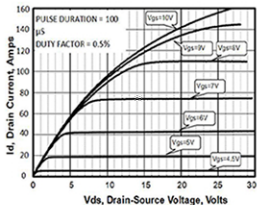


Figure 5.  $R_{ds(on)}$  vs  $V_{gs}$  vs  $I_d$

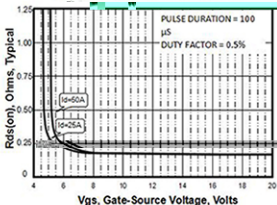


Figure 6. Peak Current Capability

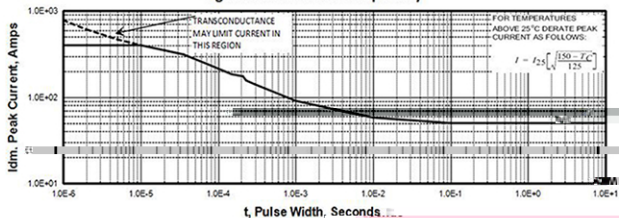


Figure 7. Transfer Characteristics

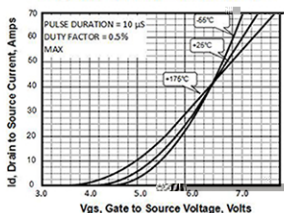


Figure 8. Unclamped Inductive Switching Capability

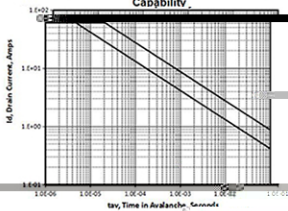


Figure 9. Drain to Source ON Resistance vs Drain Current

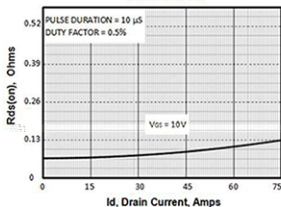


Figure 10. Rds(on) vs Junction Temperature

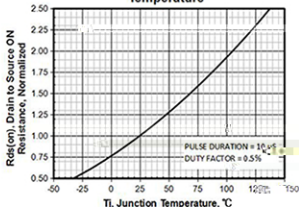


Figure 11. Breakdown Voltage vs. Temperature

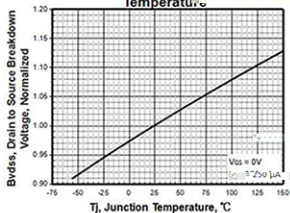


Figure 13. Maximum Safe Operating Area

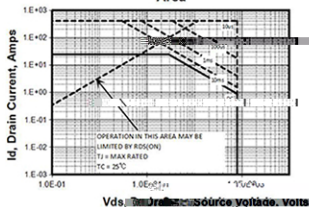


Figure 15. Typical Gate Charge

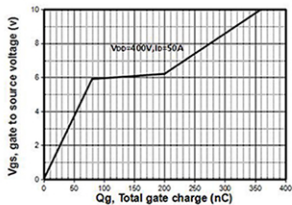


Figure 12. Inrush Voltage vs. Temperature

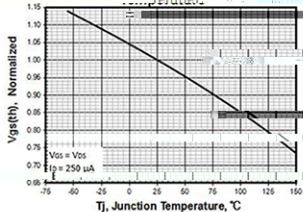


Figure 14. Capacitance vs Vds

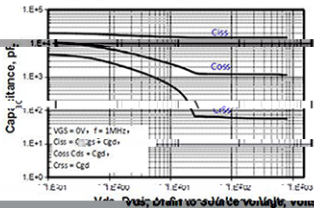
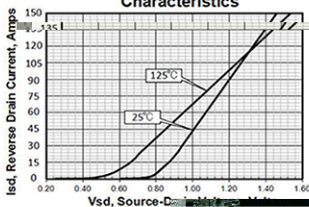


Figure 16. Body Diode Transfer Characteristics



## TEST CIRCUITS AND WAVEFORMS

Figure A: Gate Charge Test Circuit and Waveform

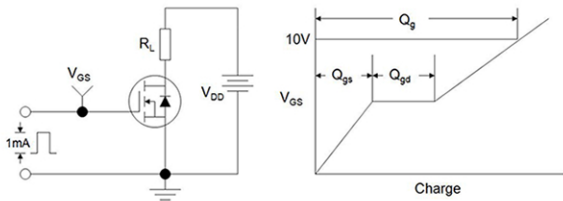


Figure B: Resistive Switching Test Circuit and Waveform

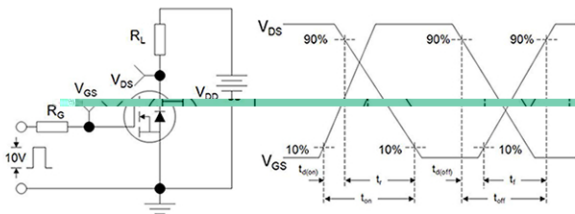


Figure C: Unclamped Inductive Switching Test Circuit and Waveform

