

# PJP4N60 / PJF4N60

## 600V N-Channel Enhancement Mode MOSFET

### FEATURES

- 4A , 600V,  $R_{DS(ON)}=2.4\Omega@V_{GS}=10V, I_D=2.0A$
- Low ON Resistance
- Fast Switching
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- Specially Designed for AC Adapter, Battery Charge and SMPS
- In compliance with EU RoHs 2002/95/EC Directives

### MECHANICAL DATA

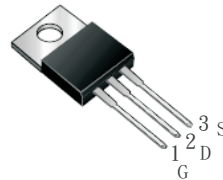
- Case: TO-220AB / ITO-220AB Molded Plastic
- Terminals : Solderable per MIL-STD-750,Method 2026

### ORDERING INFORMATION

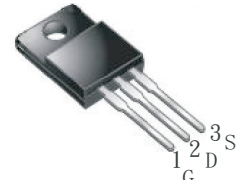
| TYPE    | MARKING | PACKAGE   | PACKING    |
|---------|---------|-----------|------------|
| PJP4N60 | P4N60   | TO-220AB  | 50PCS/TUBE |
| PJF4N60 | F4N60   | ITO-220AB | 50PCS/TUBE |

## TO-220AB / ITO-220AB

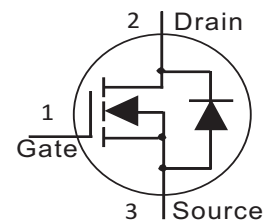
TO-220AB



ITO-220AB



### INTERNAL SCHEMATIC DIAGRAM



### Maximum RATINGS and Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted )

| PARAMETER                                                               | Symbol          | PJP4N60     | PJF4N60   | Units              |
|-------------------------------------------------------------------------|-----------------|-------------|-----------|--------------------|
| Drain-Source Voltage                                                    | $V_{DS}$        | 600         |           | V                  |
| Gate-Source Voltage                                                     | $V_{GS}$        | $\pm 30$    |           | V                  |
| Continuous Drain Current                                                | $I_D$           | 4           | 4         | A                  |
| Pulsed Drain Current <sup>1)</sup>                                      | $I_{DM}$        | 16          | 16        | A                  |
| Maximum Power Dissipation<br>Derating Factor                            | $P_D$           | 70<br>0.56  | 26<br>0.2 | W                  |
| Operating Junction and Storage Temperature Range                        | $T_J, T_{STG}$  | -55 to +150 |           | $^\circ\text{C}$   |
| Avalanche Energy with Single Pulse<br>$I_{AS}=4.4A, V_{DD}=85V, L=30mH$ | $E_{AS}$        | 330         |           | mJ                 |
| Junction-to-Case Thermal Resistance                                     | $R_{\theta JC}$ | 1.75        | 4.8       | $^\circ\text{C/W}$ |
| Junction-to Ambient Thermal Resistance(PCB mounted) <sup>2</sup>        | $R_{\theta JA}$ | 62.5        | 100       | $^\circ\text{C/W}$ |

**Note :** 1. Maximum DC current limited by the package

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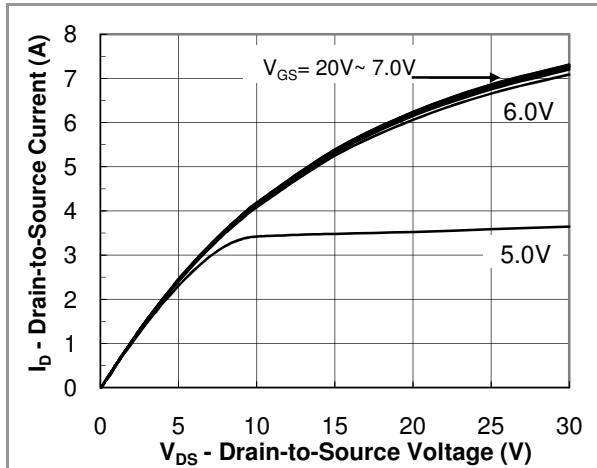
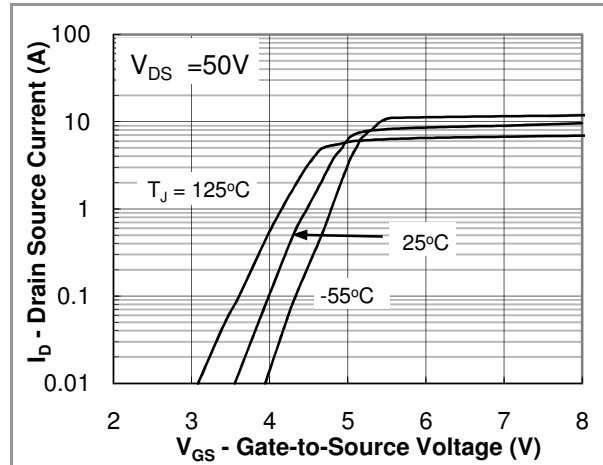
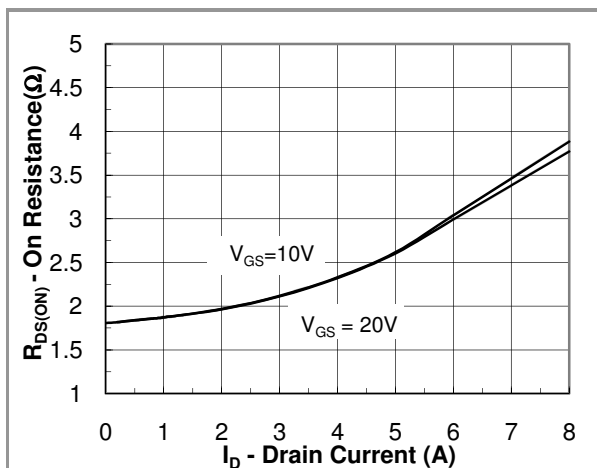
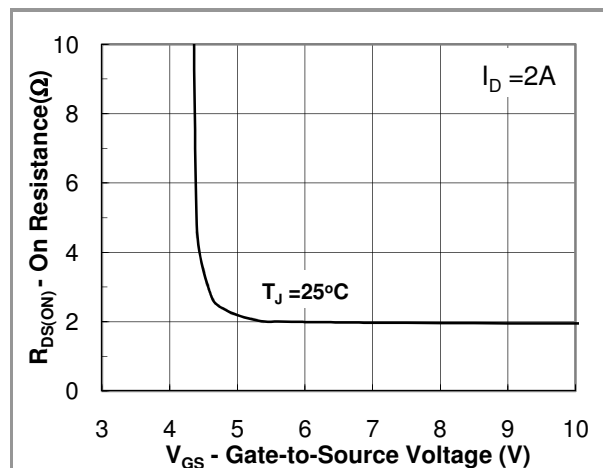
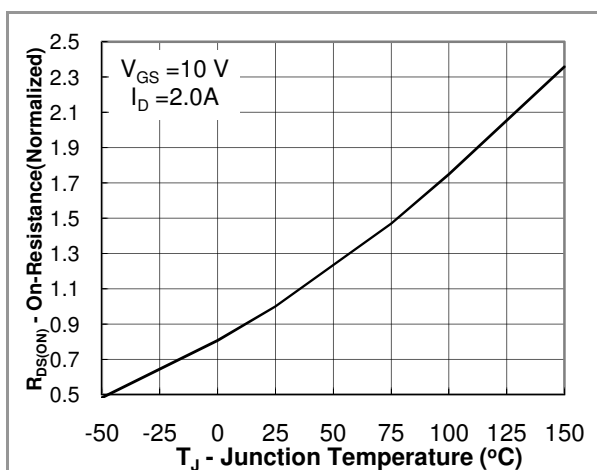
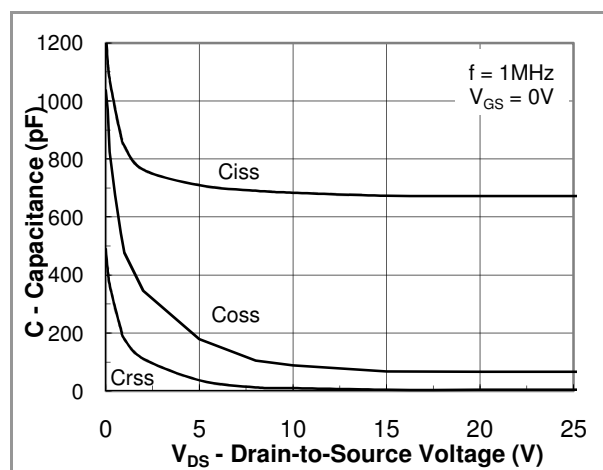
## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

| Parameter                        | Symbol              | Test Condition                                                                         | Min. | Typ. | Max. | Units |
|----------------------------------|---------------------|----------------------------------------------------------------------------------------|------|------|------|-------|
| Static                           |                     |                                                                                        |      |      |      |       |
| Drain-Source Breakdown Voltage   | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                             | 600  | -    | -    | V     |
| Gate Threshold Voltage           | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA                               | 2.0  | -    | 4.0  | V     |
| Drain-Source On-State Resistance | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.0A                                           | -    | 2.0  | 2.4  | Ω     |
| Zero Gate Voltage Drain Current  | I <sub>DSS</sub>    | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V                                             | -    | -    | 10   | uA    |
| Gate Body Leakage                | I <sub>GSS</sub>    | V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V                                             | -    | -    | ±100 | nA    |
| Dynamic                          |                     |                                                                                        |      |      |      |       |
| Total Gate Charge                | Q <sub>g</sub>      | V <sub>DS</sub> =480V, I <sub>D</sub> =4A<br>V <sub>GS</sub> =10V                      | -    | 17.2 | -    | nC    |
| Gate-Source Charge               | Q <sub>gs</sub>     |                                                                                        | -    | 4.6  | -    |       |
| Gate-Drain Charge                | Q <sub>gd</sub>     |                                                                                        | -    | 5.2  | -    |       |
| Turn-On Delay Time               | t <sub>d(on)</sub>  | V <sub>DD</sub> =300V, I <sub>D</sub> =4A<br>V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω | -    | 11.6 | 16.8 | ns    |
| Turn-On Rise Time                | t <sub>r</sub>      |                                                                                        | -    | 10.6 | 15.2 |       |
| Turn-Off Delay Time              | t <sub>d(off)</sub> |                                                                                        | -    | 25.8 | 36.8 |       |
| Turn-Off Fall Time               | t <sub>f</sub>      |                                                                                        | -    | 9.2  | 14.2 |       |
| Input Capacitance                | C <sub>iss</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V<br>f=1.0MH <sub>z</sub>                      | -    | 560  | 680  | pF    |
| Output Capacitance               | C <sub>oss</sub>    |                                                                                        | -    | 55   | 66   |       |
| Reverse Transfer Capacitance     | C <sub>rss</sub>    |                                                                                        | -    | 5.2  | 9.6  |       |
| Source-Drain Diode               |                     |                                                                                        |      |      |      |       |
| Max. Diode Forward Current       | I <sub>S</sub>      | -                                                                                      | -    | -    | 4.0  | A     |
| Max.Pulsed Source Current        | I <sub>SM</sub>     | -                                                                                      | -    | -    | 16   | A     |
| Diode Forward Voltage            | V <sub>SD</sub>     | I <sub>S</sub> =4A , V <sub>GS</sub> =0V                                               | -    | -    | 1.4  | V     |
| Reverse Recovery Time            | t <sub>rr</sub>     | V <sub>GS</sub> =0V, I <sub>F</sub> =4A<br>di/dt=100A/us                               | -    | 300  | -    | ns    |
| Reverse Recovery Charge          | Q <sub>rr</sub>     |                                                                                        | -    | 2.2  | -    | uC    |

**NOTE :** Plus Test : Pluse Width ≤ 300us, Duty Cycle ≤ 2%.

## PJP4N60 / PJF4N60

Typical Characteristics Curves (  $T_a=25^\circ\text{C}$ , unless otherwise noted)



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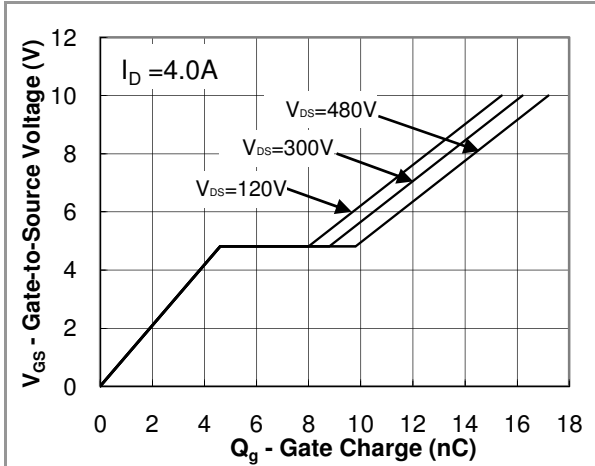


Fig. 7 Gate Charge Waveform

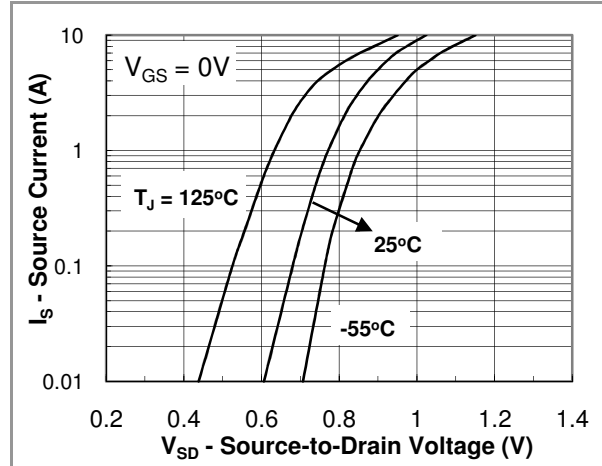


Fig. 8 Source-Drain Diode Forward Voltage

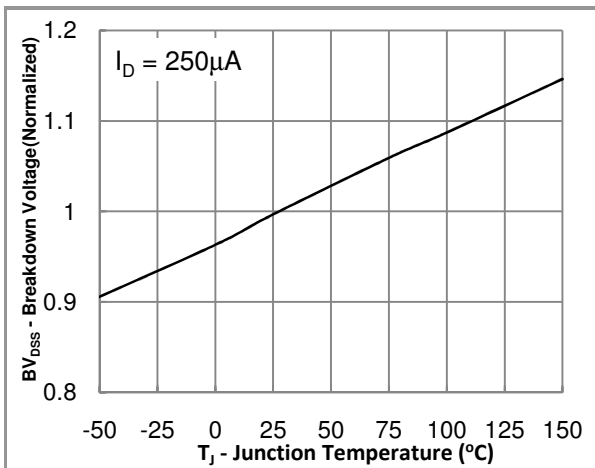


Fig. 9 Breakdown Voltage vs Junction Temperature



## PJP4N60 / PJF4N60

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