800V N-Channel MOSFETs

# PJH17N80N

## General Description

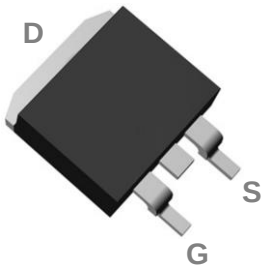
*These N-Channel enhancement mode power field effect transistors are using super junction MOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.*

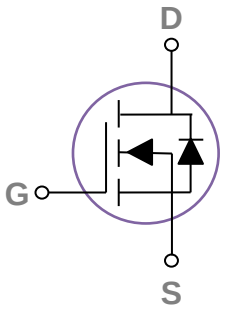
| BVDSS | RDSON | ID |
|---|---|---|
| 800V | 275mΩ | 17A |

## Features

- *800V,17A, RDS(ON) =275mΩ@VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *Green Device Available*

## TO263 Pin Configuration




## Applications

- *PFC Power Supply Stages*
- *Motor Control*
- *DC-DC Converters*
- *Adapter*

## Absolute Maximum Ratings Tc=25℃ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 800 | V |
| $V_{GS}$ | Gate-Source Voltage | ±30 | V |
| $I_D$ | Drain Current – Continuous ($T_C$=25℃) | 17 | A |
| | Drain Current – Continuous ($T_C$=100℃) | 10.8 | A |
| $I_{DM}$ | Drain Current – Pulsed[1] | 68 | A |
| EAS | Single Pulse Avalanche Energy[2] | 281 | mJ |
| IAS | Single Pulse Avalanche Current[2] | 7.5 | A |
| $P_D$ | Power Dissipation ($T_C$=25℃) | 195 | W |
| | Power Dissipation – Derate above 25℃ | 1.56 | W/℃ |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 0.64 | ℃/W |

## Electrical Characteristics ($T_J$=25 ℃, unless otherwise noted)

### Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250μA | 800 | --- | --- | V |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=800V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | μA |
| | | $V_{DS}$=640V , $V_{GS}$=0V , $T_J$=100℃ | --- | --- | 10 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±30V , $V_{DS}$=0V | --- | --- | 100 | nA |

### On Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V , $I_D$=11A | --- | 220 | 275 | mΩ |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250μA | 2 | 3 | 4 | V |

### Dynamic and switching Characteristics[3]

| | | | | | | |
|---|---|---|---|---|---|---|
| $Q_g$ | Total Gate Charge[3,4] | $V_{DS}$=640V , $V_{GS}$=10V , $I_D$=17A | --- | 57.5 | 86 | nC |
| $Q_{gs}$ | Gate-Source Charge[3,4] | | --- | 6.6 | 10 | |
| $Q_{gd}$ | Gate-Drain Charge[3,4] | | --- | 24 | 36 | |
| $T_{d(on)}$ | Turn-On Delay Time[3,4] | $V_{DS}$=400V , $V_{GS}$=10V , $R_G$=25Ω $I_D$=17A | --- | 32 | 50 | ns |
| $T_r$ | Rise Time[3,4] | | --- | 56.5 | 90 | |
| $T_{d(off)}$ | Turn-Off Delay Time[3,4] | | --- | 160 | 240 | |
| $T_f$ | Fall Time[3,4] | | --- | 49 | 75 | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=640V , $V_{GS}$=0V , F=1MHz | --- | 1800 | 2700 | pF |
| $C_{oss}$ | Output Capacitance | | --- | 40 | 60 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 7 | 11 | |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, F=1MHz | --- | 2.1 | --- | Ω |

### Guaranteed Avalanche Energy

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| EAS | Single Pulse Avalanche Energy | $V_{DD}$=100V, L=10mH, $I_{AS}$=3.5A | 61 | --- | --- | mJ |

### Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | $V_G$=$V_D$=0V , Force Current | --- | --- | 17 | A |
| $I_{SM}$ | Pulsed Source Current | | --- | --- | 34 | A |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V , $I_S$=10A , $T_J$=25℃ | --- | --- | 1.4 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_R$=400V, $I_S$=17A di/dt=100A/μs, $T_J$=25℃ | --- | 495 | --- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 8920 | --- | nC |

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $V_{DD}$=100V,$V_{GS}$=20V,L=10mH,$I_{AS}$=7.5A.,$R_G$=25Ω,Starting $T_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300μs , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

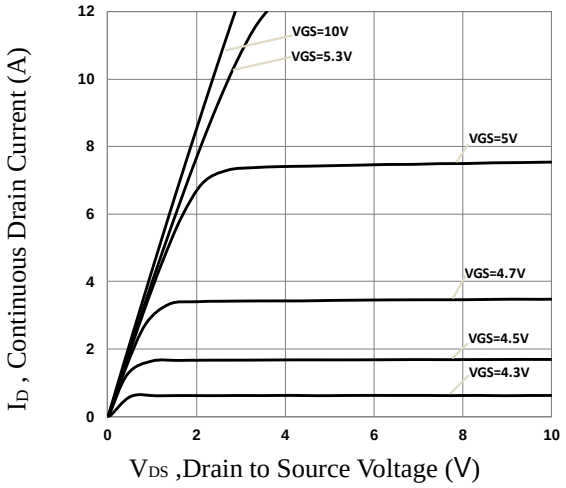



**Fig.1 Typical Output Characteristics**

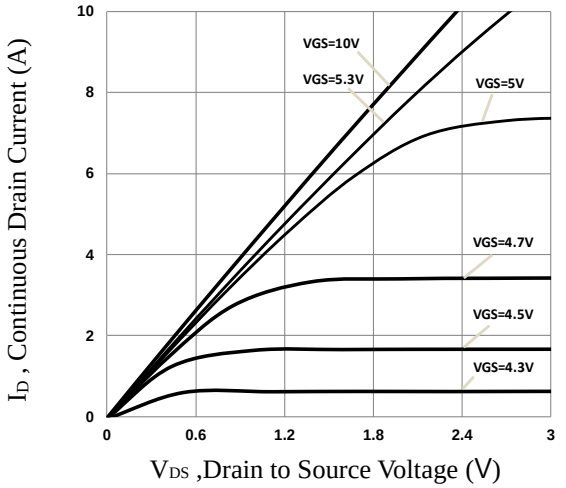



**Fig.2 Typical Output Characteristics**

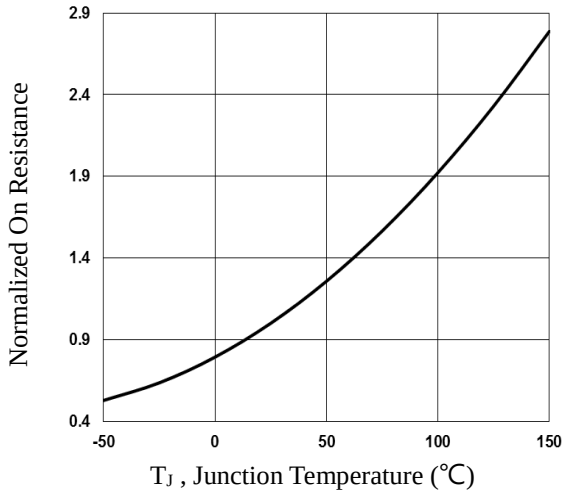



**Fig.3 Normalized RDSON vs. $T_J$**

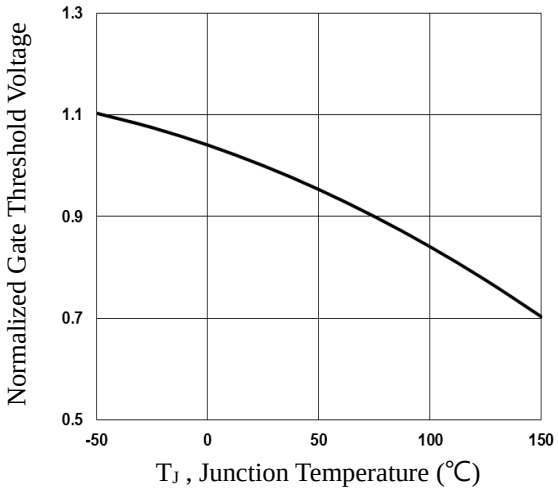



**Fig.4 Normalized $V_{th}$ vs. $T_J$**

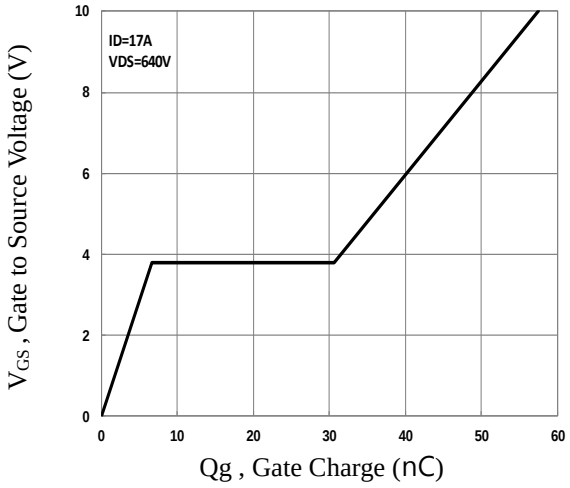



**Fig.5 Gate Charge Characteristics**

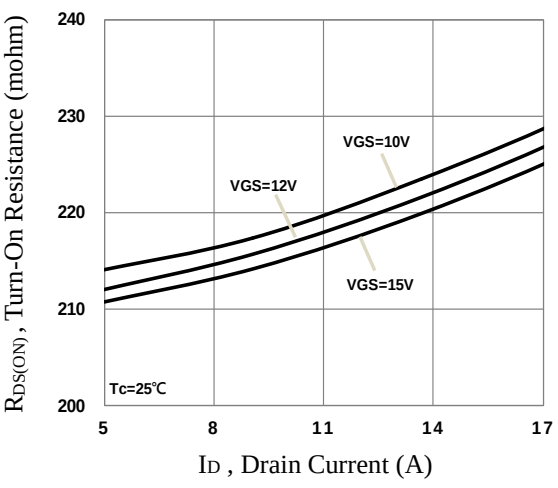



**Fig.6 Turn-On Resistance vs. ID**

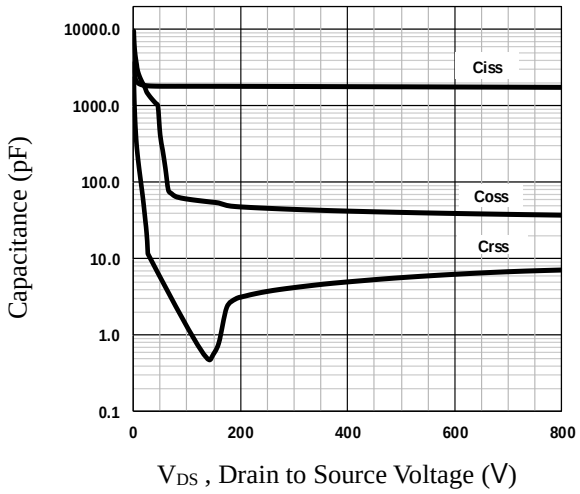



**Fig.7 Capacitance Characteristics**

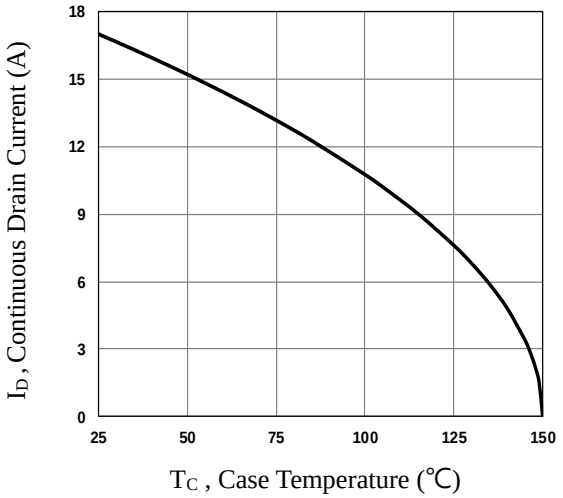



**Fig.8 Continuous Drain Current vs. $T_C$**

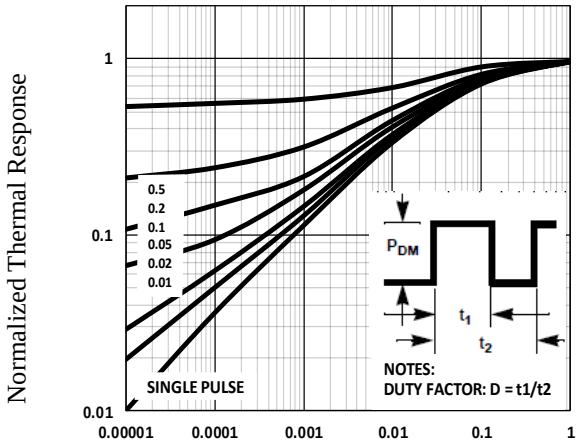



**Fig.9 Normalized Transient Impedance**

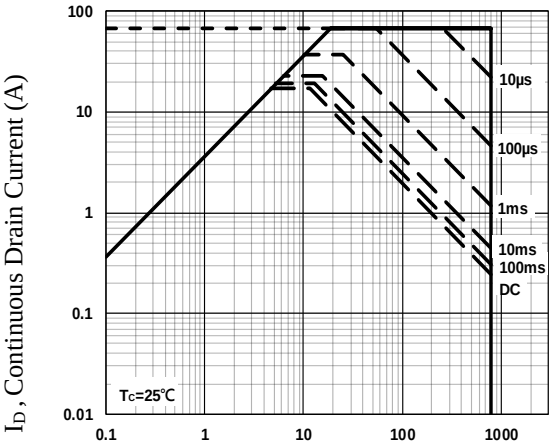



**Fig.10 Maximum Safe Operation Area**

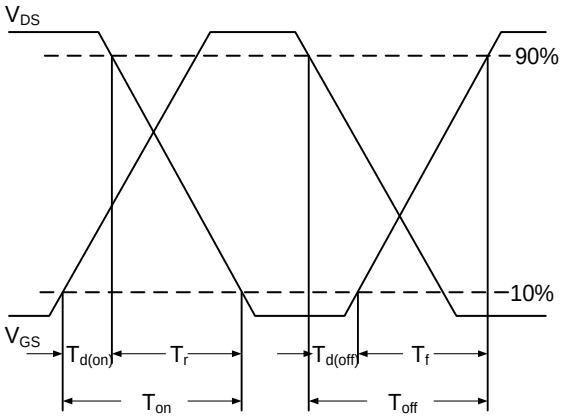



**Fig.11 Switching Time Waveform**

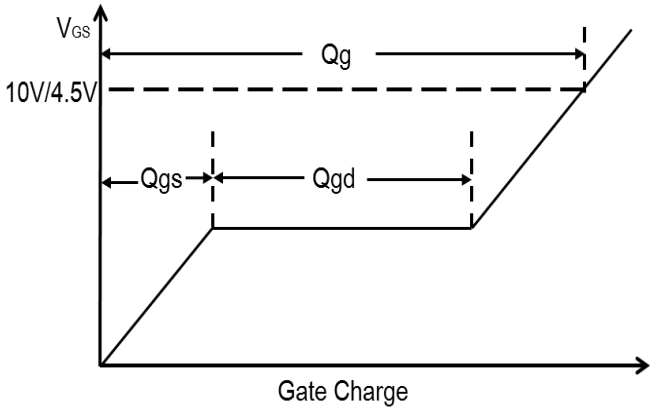
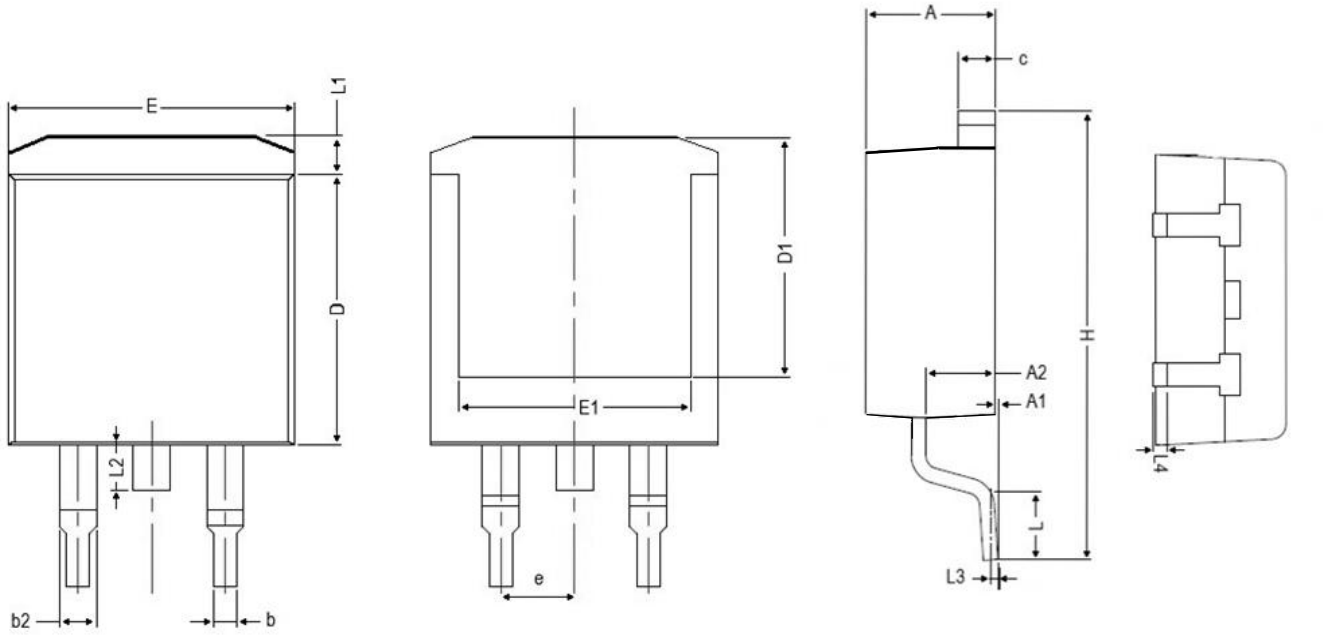



**Fig.12 Gate Charge Waveform**

# TO263 PACKAGE INFORMATION




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MAX | MIN | MAX | MIN |
| A | 4.850 | 4.200 | 0.191 | 0.165 |
| A1 | 0.300 | 0.000 | 0.012 | 0.000 |
| A2 | 2.900 | 2.200 | 0.114 | 0.087 |
| b | 0.950 | 0.700 | 0.037 | 0.028 |
| b2 | 1.700 | 1.000 | 0.067 | 0.039 |
| c | 1.450 | 1.150 | 0.057 | 0.045 |
| D | 9.500 | 8.350 | 0.374 | 0.329 |
| D1 | 9.150 | 6.400 | 0.360 | 0.252 |
| E | 10.500 | 9.600 | 0.413 | 0.378 |
| E1 | 8.900 | 6.850 | 0.350 | 0.270 |
| e | 2.540 BSC | | 0.100 BSC | |
| H | 15.900 | 14.600 | 0.626 | 0.575 |
| L | 2.800 | 1.700 | 0.110 | 0.067 |
| L1 | 1.700 | 1.050 | 0.067 | 0.041 |
| L2 | 2.100 | 1.300 | 0.083 | 0.051 |
| L3 | 0.250 BSC | | 0.010 BSC | |
| L4 | 0.750 | 0.200 | 0.030 | 0.008 |