LinearDimensions
SEMICONDUCTOR

# LND820/821/822/823

## POWER MOSFET

## GENERAL DESCRIPTION

The LND820 series provides the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The TO-220 package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 watts. The low thermal resistance and low package cost of the TO-220 contribute to its wide acceptance throughout the industry.

## FEATURES

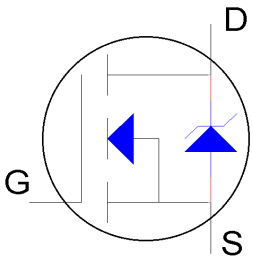
- **$V_{DSS}$ =450V-500V**

  **$R_{DS\ (on)}$ = 3.0 Ω-4.0 Ω**

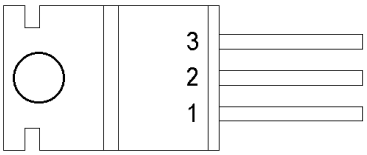
  **$I_D$=2.2A and 2.5A**

- Dynamic dv/dt Rating
- Repetitive Avalanche rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirement

## SYMBOL




## PIN DIAGRAM




TO-220

## ABSOLUTE MAXIMUM RATING

| Symbol | Parameter | Max | Units |
|---|---|---|---|
| $I_D$@Tc=25ºC | Continuous Drain Current,$V_{GS}$ @ 10V | 2.5 | A |
| $I_D$@Tc=100ºC | Continuous Drain Current, $V_{GS}$ @ 10V | 1.6 | |
| $I_{DM}$ | Pulsed Drain Current(1) | 8.0 | |
| $P_D$ @Tc=25ºC | Power Dissipation | 50 | W |
| $I_D$@Tc=25ºC | Linear Derating Factor | 0.40 | W/ºC |
| $V_{GS}$ | Gate-to-Source Voltage | ±20 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy(2) | 210 | mJ |
| $I_{AR}$ | Avalanche Current (1) | 2.5 | A |
| $E_{AR}$ | Repetitive Avalanche Energy (1) | 5.0 | mJ |
| dv/dt | Peak Diode Recovery dv/dt(3) | 3.5 | V/ns |
| $T_J$<br>$T_{STG}$ | Operating Junction and Storage temperature Range | -55 to +150 | ºC |
| | Soldering Temperature, for 10 seconds | 300<br>(1.6mm from case) | |

## THERMAL RESISTANCE

| Symbol | Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| $Ro_{JC}$ | Junction-to-case | - | - | 2.5 | ºC/W |
| $Ro_{CS}$ | Case-to-Sink, Flat, Greased Surface | - | 0.50 | - | |
| $Ro_{JA}$ | Junction-to-Ambint | - | - | 62 | |

## ELECTRICAL CHARACTERISTICS

($T_C$=25°C unless otherwise specified)

| Symbol | Parameter | | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-source Breakdown Voltage | LND-820/822 | $V_{GS}$=0V, $I_D$ = 250µA | 500 | - | - | V |
| | | LND821/823 | | 450 | | | |
| $\Delta V_{(BR)DSS}$ / $\Delta T_J$ | Breakdown Voltage Temp. Coefficient | | Reference to 25ºC $I_D$=1mA | - | 0.59 | - | V/ºC |
| $I_{D(on)}$ | On-State Drain Current(Note 2) | LND820/821 | $V_{GS}$ > $I_{D(on)}$ x $R_{DS(on)}$Max, $V_{GS}$=10V | 2.5 | - | - | A |
| | | LND821/823 | | 2.2 | | | |
| $R_{DS(ON)}$ | Static Drain-to-Source On-Resistace | LND820/821 | $V_{GS}$ =0V,$I_D$ =1.5A(4) | | | 3.0 | Ω |
| | | LND822/823 | | | | 4.0 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | | $V_{DS}$=$V_{GS}$, $I_D$=250µA | 2.0 | - | 4.0 | V |
| $g_{fs}$ | Forward Transconductance | | $V_{DS}$=50V,$I_D$ =1.5A(4) | 1.5 | - | - | S |
| $I_{DSS}$ | Drain-to-source Leakage Current ($T_C$=125ºC) | | $V_{DS}$=500V,$V_{GS}$ =0V | - | | 25 | µA |
| | | | $V_{DS}$= 400V,$V_{GS}$ = 0V | - | | 250 | µA |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | | $V_{GS}$=-20V | - | - | 100 | nA |
| | Gate-to-Source Reverse Leakage | | $V_{GS}$=-20V | - | - | -100 | |
| $Q_g$ | Total Gate Charge | | $I_D$=2.1A<br>$V_{DS}$=400V<br>$V_{GS}$ =10V (4) | - | - | 24 | nC |
| Qqs | Gate-to-Source Charge | | | - | - | 3.3 | |
| | Gate-to-drain(“Miller”) Charge | | | - | - | 13 | |
| $t_{d(on)}$ | Turn-on Delay Time | | $V_{DD}$ =250V | | 8.0 | | ns |
| $t_r$ | Rise time | | $I_D$=2.1A | - | 8.6 | | |
| $t_d$(off) | Turn-off Delay time | | $R_G$=18Ω | - | 33 | | |
| $t_f$ | Fall time | | $R_D$=100Ω (4) | - | 16 | | |
| $L_D$ | Internal Drain Inductance | | Between lead 6mm (0.25 in.) | - | 4.5 | | nH |
| $L_S$ | Input Source Inductance | | From package and center of die contact | - | 7.5 | | |
| $C_{iss}$ | Input Capacitance | | $V_{GS}$=0V<br>$V_{DS}$=25V<br>F=1.0 MHz | - | 360 | | pF |
| $C_{oss}$ | Output Capacitance | | | - | 92 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | - | 37 | | |

## SOURCE-DRAIN RATING AND CHARACTERISTICS

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current | MOSFET symbol showing the integral reverse p-n junction diode | - | - | 2.5 | A |
| $I_{SM}$ | Pulsed Source Current (Body Diode) (1) | | - | - | 8.0 | |
| $V_{SD}$ | Diode Forward Voltage | $T_J$=25°C, $I_S$=2.5A, $V_{GS}$=0V(4) | - | - | 1.6 | V |
| $t_{rr}$ | Reverse Recovery Time | $T_J$=25°C, $I_F$=2.1A, di/dt=100A/µs (4) | - | - | 520 | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 0.70 | 1.4 | µC |
| $t_{ON}$ | Forward Turn-On Time | Intrinsic turn-on time is negligible (turn-on is dominated by $L_S$+$L_D$) | | | | |

Notes : 1 : Repetitvie rating :pulse width limited by max. junction temperature
2 : $V_{DD}$=50V, starting $T_J$ =25°C,L=60mH $R_G$=25Ω, $I_{AS}$ =2.5A
3 : $I_{SD}$ ≤ 2.5A, di/dt≤50 A/µs, $V_{DD}$ ≤ $V_{(BR)DSS}$ ,$T_J$≤150°C
4 : Pulse width≤ 300µs; duty cycle≤ 2%