

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 30V           | 4.2mΩ@10V       | 50A   |
|               | 5.7mΩ@4.5V      |       |



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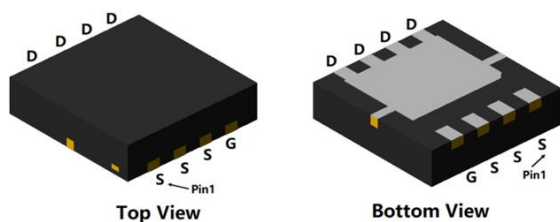
## Feature

- Fast switching speed
- Low On-Resistance
- 100% Single Pulse avalanche energy Test

## Applications

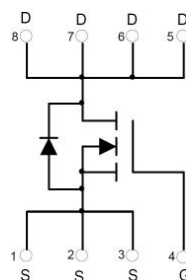
- DC-DC Converters.
- Power Management

## Package

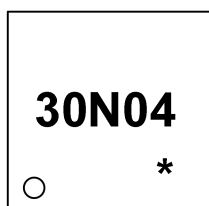


PDFN3X3-8L

## Circuit diagram



## Marking



30N04  
\*

:Device Code  
:Month Code

## Order Information

| Device    | Package    | Unit/Tape |
|-----------|------------|-----------|
| SP30N04NJ | PDFN3X3-8L | 5000      |

**Absolute maximum ratings (Ta=25°C, unless otherwise noted)**

| Parameter                                  | Symbol          | Rating     | Unit |
|--------------------------------------------|-----------------|------------|------|
| Drain-Source Voltage                       | $V_{DSS}$       | 30         | V    |
| Gate-Source Voltage                        | $V_{GSS}$       | $\pm 20$   | V    |
| Continuous Drain Current (Tc=25°C)         | $I_D$           | 50         | A    |
| Pulse Drain Current Tested                 | $I_{DM}$        | 200        | A    |
| Single Pulse Avalanche Energy <sup>1</sup> | $E_{AS}$        | 110        | mJ   |
| Dissipation (Tc=25°C)                      | $P_D$           | 28         | W    |
| Thermal Resistance Junction-to-Case        | $R_{\theta JC}$ | 4.4        | °C/W |
| Storage Temperature Range                  | $T_{STG}$       | -55 to 150 | °C   |
| Operating Junction Temperature Range       | $T_J$           | -55 to 150 | °C   |

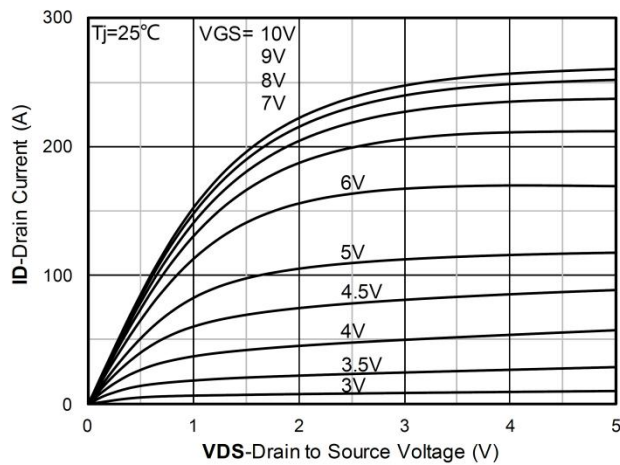
**Electrical characteristics (Ta=25°C, unless otherwise noted)**

| Parameter                         | Symbol            | Conditions                      | Min. | Typ. | Max. | Unit |
|-----------------------------------|-------------------|---------------------------------|------|------|------|------|
| Static Characteristics            |                   |                                 |      |      |      |      |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub> | VGS=0V , ID=250uA               | 30   | -    | -    | V    |
| Drain-Source Leakage Current      | IDSS              | VDS=24V , VGS=0V , TJ=25℃       | -    | -    | 1    | uA   |
| Gate-Source Leakage Current       | IGSS              | VGS=±20V , VDS=0V               | -    | -    | ±100 | nA   |
| Gate Threshold Voltage            | VGS(th)           | VGS=VDS , ID =250uA             | 1.0  | 1.8  | 2.5  | V    |
| Static Drain-Source On-Resistance | RDS(ON)           | VGS=10V, ID=20A                 | -    | 4.2  | 5.5  | mΩ   |
|                                   |                   | VGS=4.5V, ID=15A                | -    | 5.7  | 8    |      |
| Dynamic characteristics           |                   |                                 |      |      |      |      |
| Input Capacitance                 | Ciss              | VDS=15V , VGS=0V , f=1MHz       | -    | 1788 | -    | pF   |
| Output Capacitance                | Coss              |                                 | -    | 225  | -    |      |
| Reverse Transfer Capacitance      | Crss              |                                 | -    | 180  | -    |      |
| Total Gate Charge                 | Qg                | VDS=15V , VGS=10V , ID=20A      | -    | 52.8 | -    | nC   |
| Gate-Source Charge                | Qgs               |                                 | -    | 12.3 | -    |      |
| Gate-Drain Charge                 | Qgd               |                                 | -    | 10.8 | -    |      |
| Switching Characteristics         |                   |                                 |      |      |      |      |
| Turn-On Delay Time                | Td(on)            | VDD=20V, VGS=10V , RG=3Ω, ID=2A | -    | 9    | -    | nS   |
| Rise Time                         | Tr                |                                 | -    | 15.5 | -    |      |
| Turn-Off Delay Time               | Td(off)           |                                 | -    | 31   | -    |      |
| Fall Time                         | Tf                |                                 | -    | 9    | -    |      |
| Diode Characteristics             |                   |                                 |      |      |      |      |
| Diode Forward Voltage             | VSD               | VGS=0V , IS=1A , TJ=25℃         | -    | -    | 1.2  | V    |
| Diode Continuous Current          | IS                |                                 | -    | -    | 50   | A    |
| Reverse recover time              | Trr               | IS=15A, di/dt=100A/us, Tj=25℃   | -    | 26   | -    | nS   |
| Reverse recovery charge           | Qrr               |                                 | -    | 11   | -    | nC   |

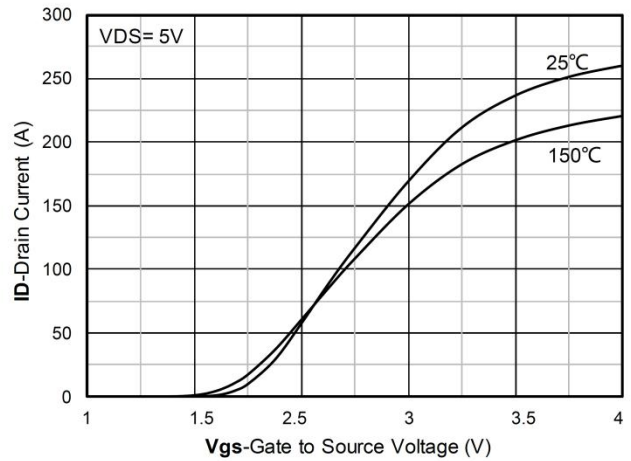
**Note:**

- The EAS test condition is  $V_{DD}=15V, V_G=10V, L=0.5mH, R_g=25\Omega$

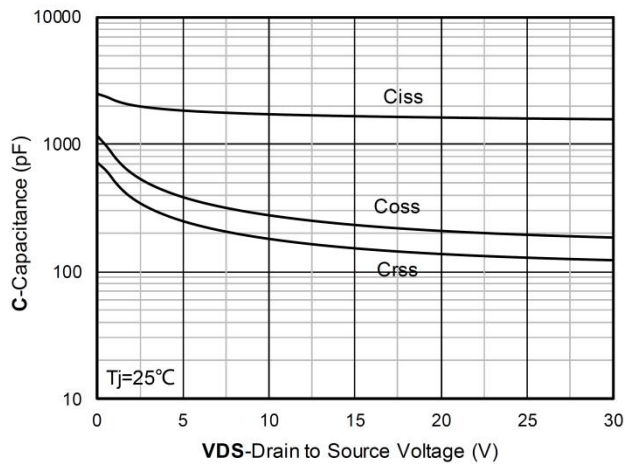
## Typical Characteristics



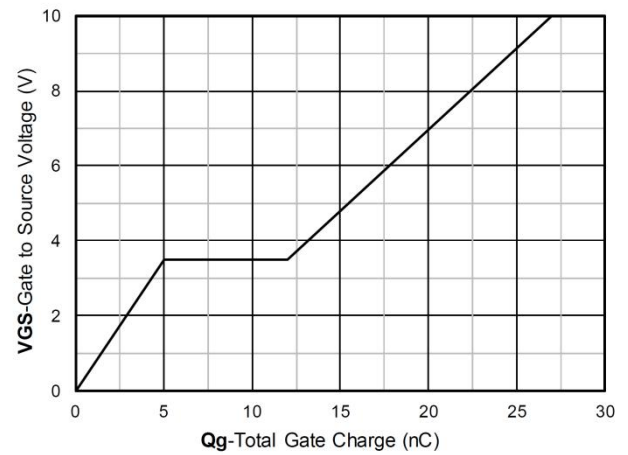
Output Characteristics



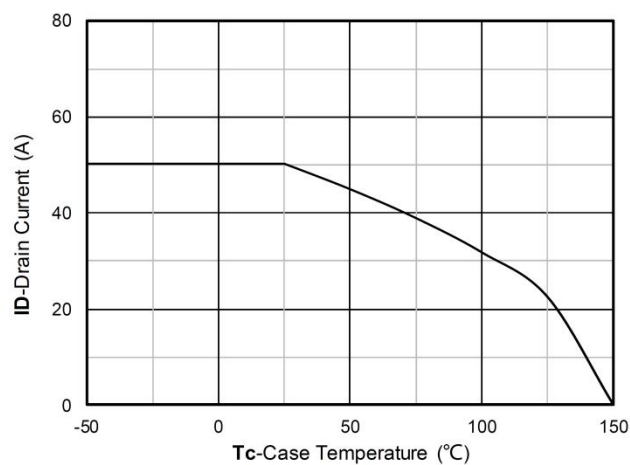
Transfer Characteristics



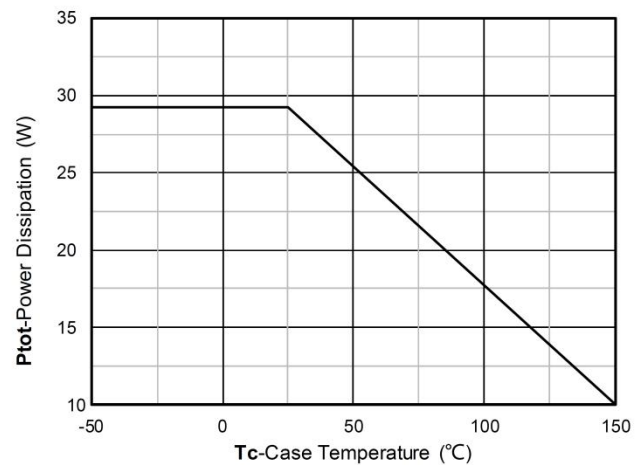
Capacitance Characteristics



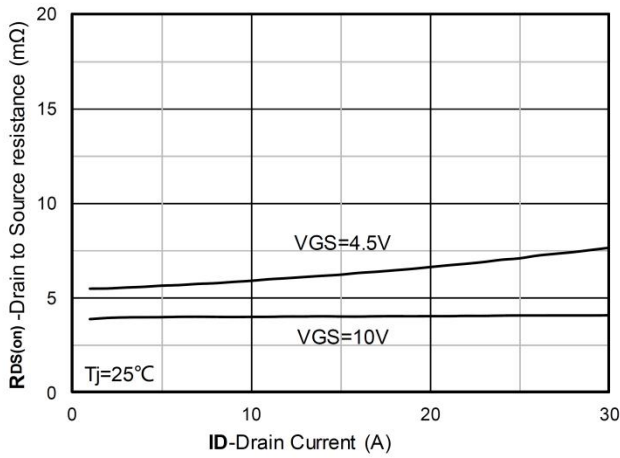
Gate Charge



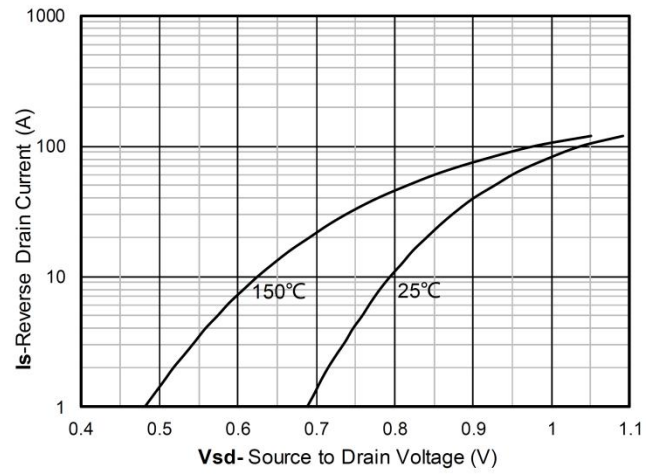
Current dissipation



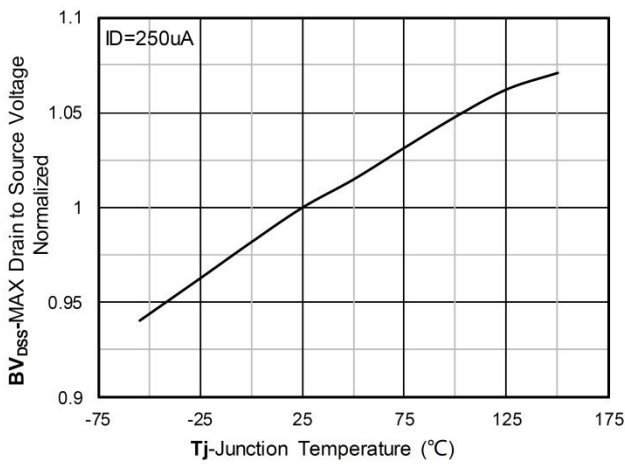
Power dissipation



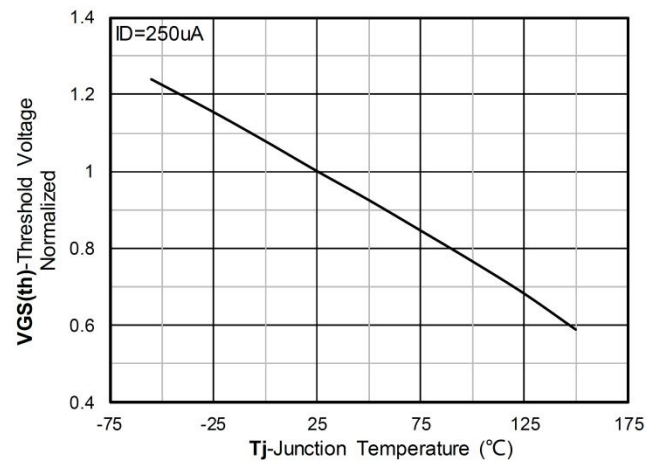
RDS(on) VS Drain Current



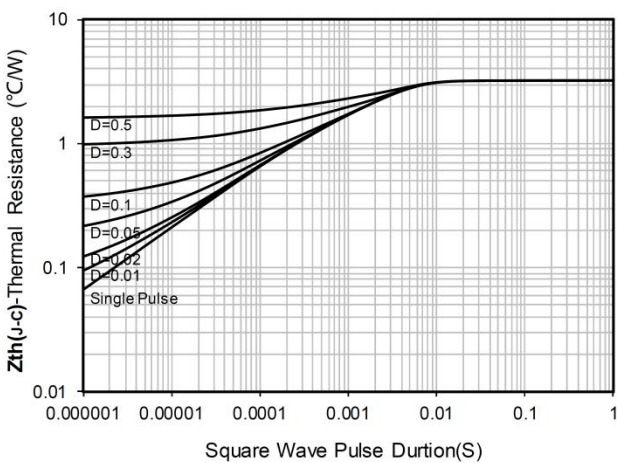
Forward characteristics of reverse diode



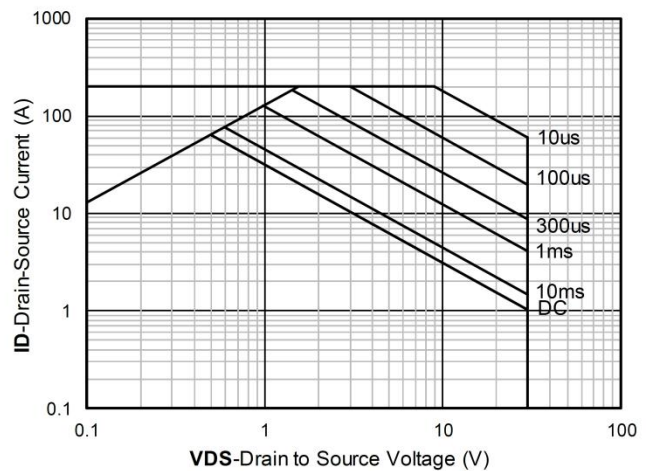
Normalized breakdown voltage



Normalized Threshold voltage



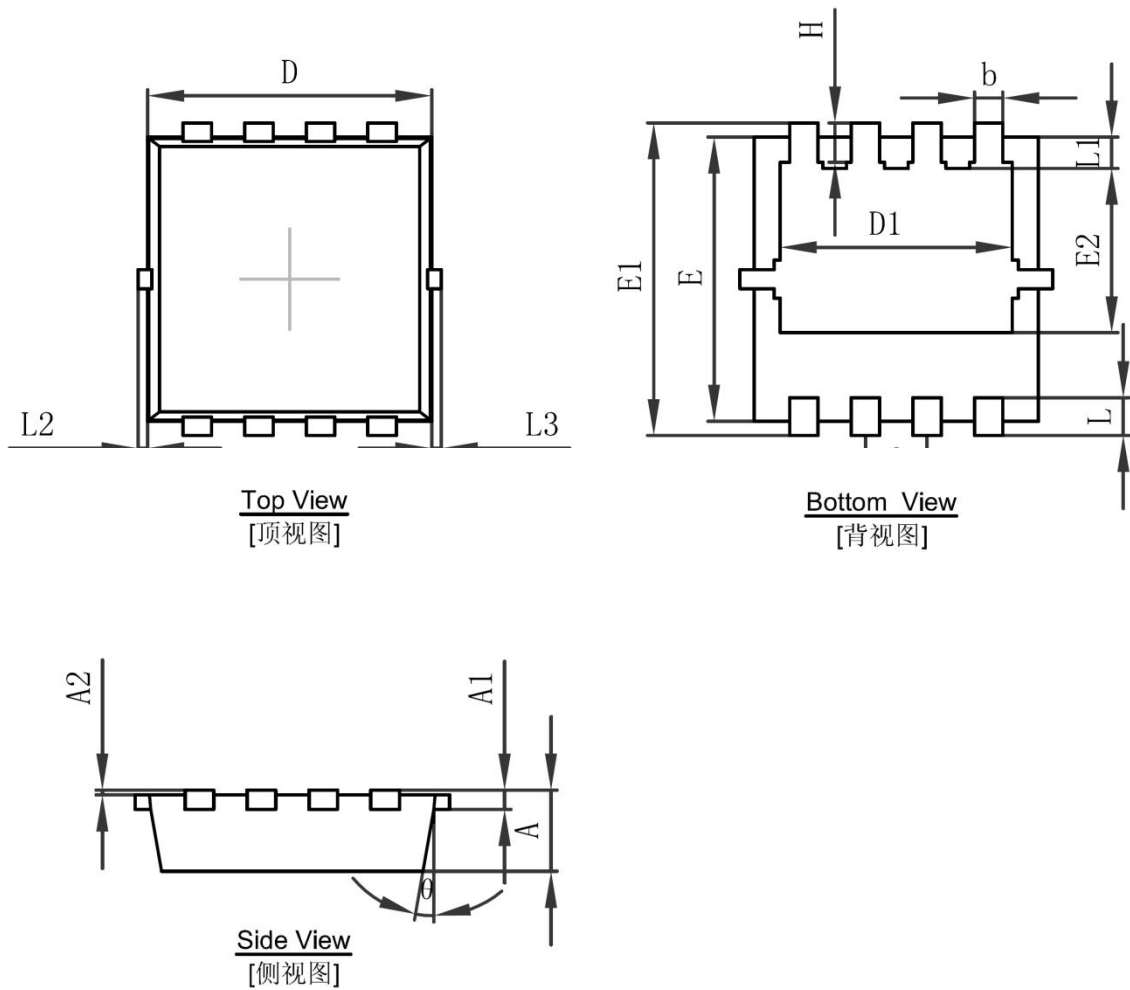
Maximum Transient Thermal Impedance



Safe Operation Area



## PDFN3X3-8L Package Information



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.650                     | 0.850 | 0.026                | 0.033 |
| A1     | 0.152 REF.                |       | 0.006 REF.           |       |
| A2     | 0~0.05                    |       | 0~0.002              |       |
| D      | 2.900                     | 3.100 | 0.114                | 0.122 |
| D1     | 2.300                     | 2.600 | 0.091                | 0.102 |
| E      | 2.900                     | 3.100 | 0.114                | 0.122 |
| E1     | 3.150                     | 3.450 | 0.124                | 0.136 |
| E2     | 1.535                     | 1.935 | 0.060                | 0.076 |
| b      | 0.200                     | 0.400 | 0.008                | 0.016 |
| e      | 0.550                     | 0.750 | 0.022                | 0.030 |
| L      | 0.300                     | 0.500 | 0.012                | 0.020 |
| L1     | 0.180                     | 0.480 | 0.007                | 0.019 |
| L2     | 0~0.100                   |       | 0~0.004              |       |
| L3     | 0~0.100                   |       | 0~0.004              |       |
| H      | 0.315                     | 0.515 | 0.012                | 0.020 |
| θ      | 9°                        | 13°   | 9°                   | 13°   |

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