

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| 40V           | 3mΩ@10V         | 105A  |
|               | 4mΩ@4.5V        |       |



**合肥矽普半导体**

Siliup Semiconductor Technology Co., Ltd

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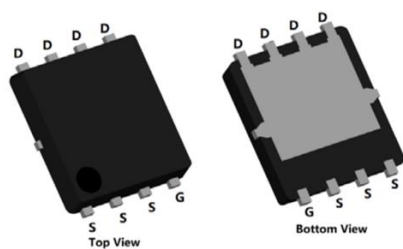
## Feature

- Fast switching speed
- Surface mount package
- ROHS Compliant & Halogen-Free
- 100% Single Pulse avalanche energy Test

## Applications

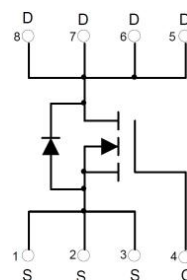
- DC-DC Converters.
- Motor Control.

## Package

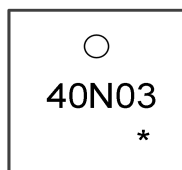


PDFN5X6-8L

## Circuit diagram



## Marking



40N03  
\*

:Device Code  
:Month Code

## Order Information

| Device    | Package    | Unit/Tape |
|-----------|------------|-----------|
| SP40N03NK | PDFN5X6-8L | 5000      |

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

| Parameter                                   | Symbol          | Rating     | Unit |
|---------------------------------------------|-----------------|------------|------|
| Drain-Source Voltage                        | $V_{DS}$        | 40         | V    |
| Gate-Source Voltage                         | $V_{GS}$        | $\pm 20$   | V    |
| Continuous Drain Current (Tc=25°C)          | $I_D$           | 105        | A    |
| Continuous Drain Current (Tc=100°C)         | $I_D$           | 70         | A    |
| Pulse Drain Current Tested                  | $I_{DM}$        | 420        | A    |
| Single pulsed avalanche energy <sup>1</sup> | $E_{AS}$        | 462        | mJ   |
| Power Dissipation (Tc=25°C)                 | $P_D$           | 83         | W    |
| Thermal Resistance Junction-to-Case         | $R_{\theta JC}$ | 1.5        | °C/W |
| Storage Temperature Range                   | $T_{STG}$       | -55 to 150 | °C   |
| Operating Junction Temperature Range        | $T_J$           | -55 to 150 | °C   |

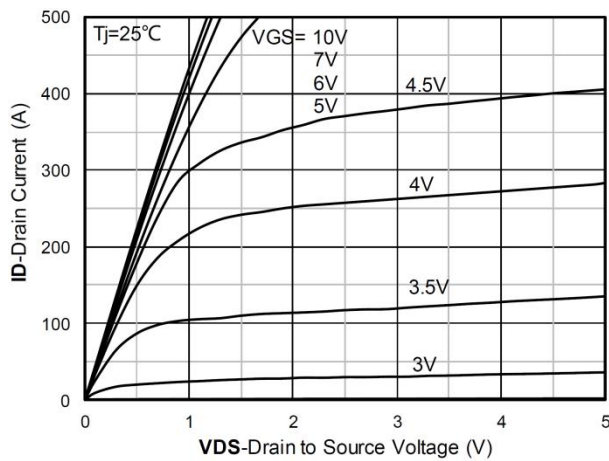
**Electrical characteristics (Ta=25°C, unless otherwise noted)**

| 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  | 1.5  | 2.5  | V    |
| Static Drain-Source On-Resistance     | RDS(ON)           | VGS =10V, ID =20A               | -    | 3    | 3.8  | mΩ   |
|                                       |                   | VGS =4.5V, ID =10A              | -    | 4    | 5.5  |      |
| Dynamic characteristics               |                   |                                 |      |      |      |      |
| Input Capacitance                     | Ciss              | VDS=20V , VGS=0V , f=1MHz       | -    | 5595 | -    | pF   |
| Output Capacitance                    | Coss              |                                 | -    | 421  | -    |      |
| Reverse Transfer Capacitance          | Crss              |                                 | -    | 380  | -    |      |
| Total Gate Charge                     | Qg                | VDS=20V , VGS=10V , ID=30A      | -    | 65   | -    | nC   |
| Gate-Source Charge                    | Qgs               |                                 | -    | 11   | -    |      |
| Gate-Drain Charge                     | Qgd               |                                 | -    | 16   | -    |      |
| Switching Characteristics             |                   |                                 |      |      |      |      |
| Turn-On Delay Time                    | Td(on)            | VDD=20V VGS=10V , RG=3Ω, ID=30A | -    | 12   | -    | nS   |
| Rise Time                             | Tr                |                                 | -    | 16   | -    |      |
| Turn-Off Delay Time                   | Td(off)           |                                 | -    | 37   | -    |      |
| Fall Time                             | Tf                |                                 | -    | 14   | -    |      |
| Diode Characteristics                 |                   |                                 |      |      |      |      |
| Diode Forward Voltage                 | VSD               | VGS=0V , IS=1A , TJ=25℃         | -    | -    | 1.2  | V    |
| Maximum Body-Diode Continuous Current | IS                |                                 | -    | -    | 105  | A    |
| Reverse recover time                  | Trr               | IS=30A, di/dt=100A/us, Tj=25℃   | -    | 23   | -    | nS   |
| Reverse recovery charge               | Qrr               |                                 | -    | 10   | -    | nC   |

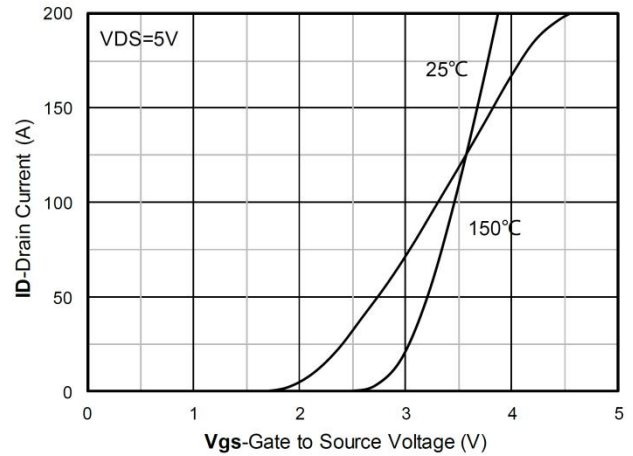
**Note:**

- The EAS Test condition is  $V_{DD}=20V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$

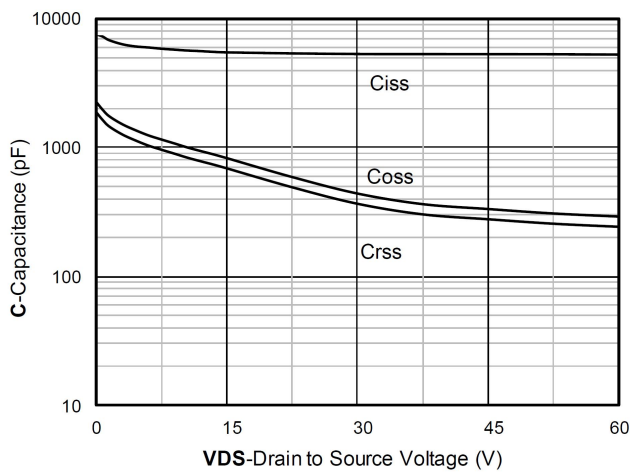
## Typical Characteristics



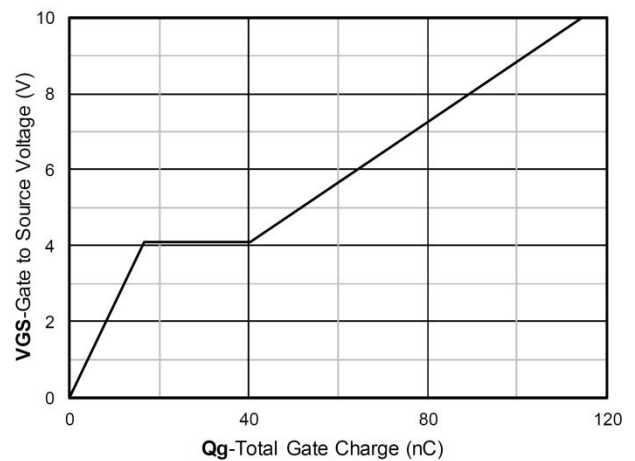
Output Characteristics



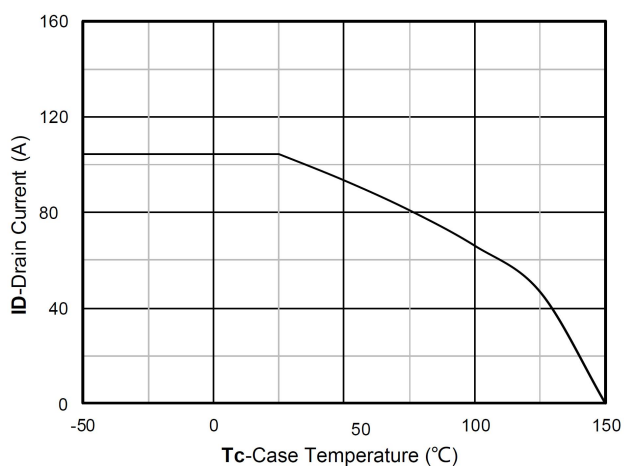
Transfer Characteristics



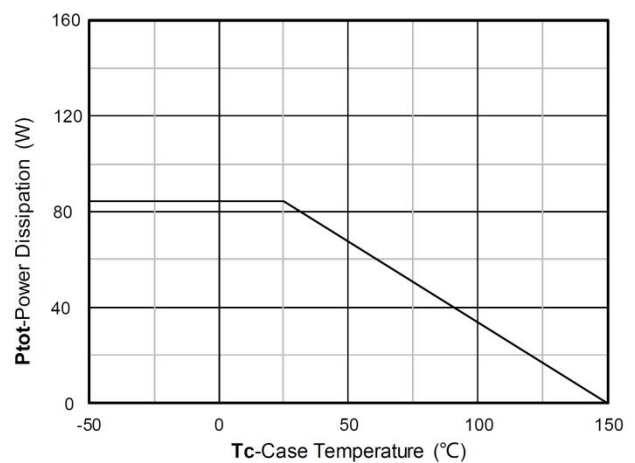
Capacitance Characteristics



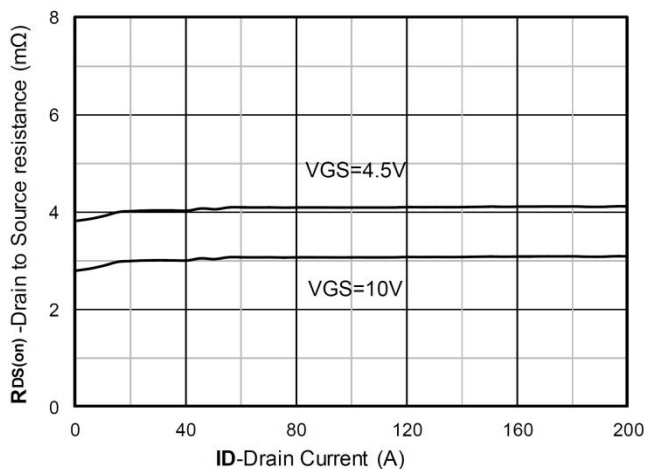
Gate Charge



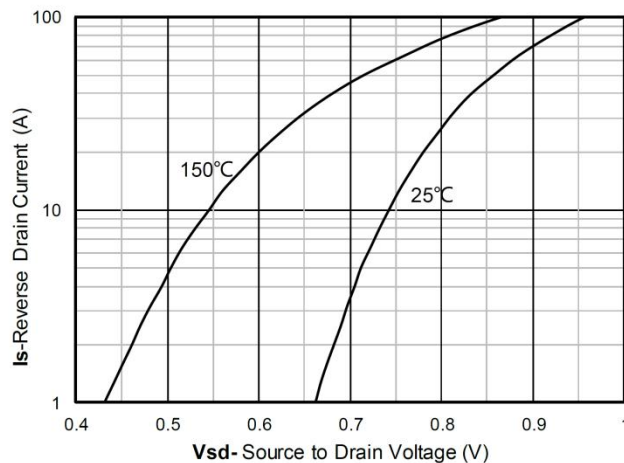
Current dissipation



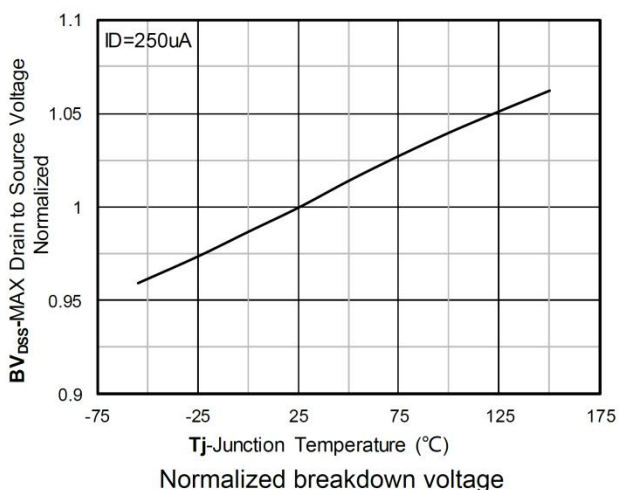
Power dissipation



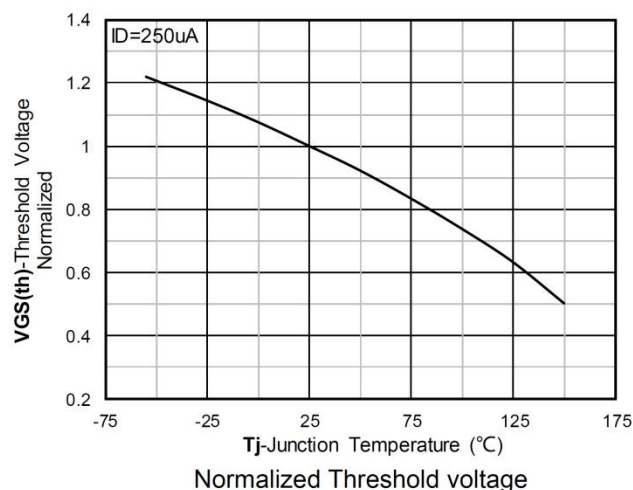
$R_{DS(on)}$  VS Drain Current



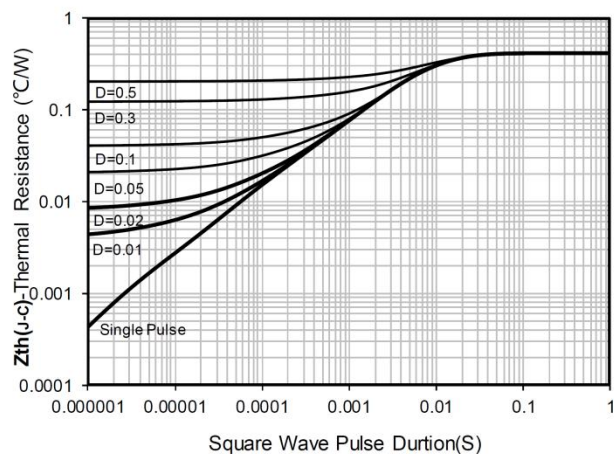
Forward characteristics of reverse diode



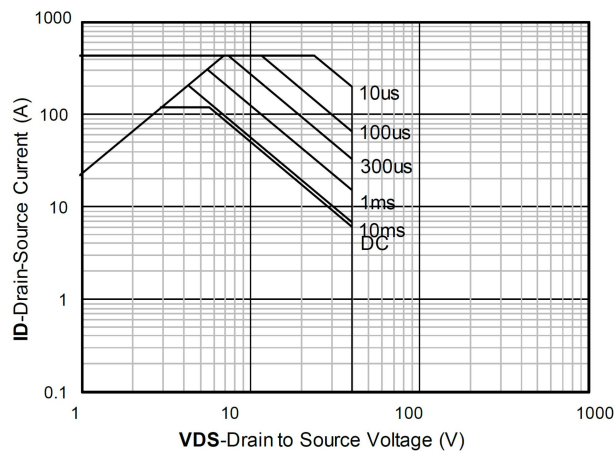
Normalized breakdown voltage



Normalized Threshold voltage

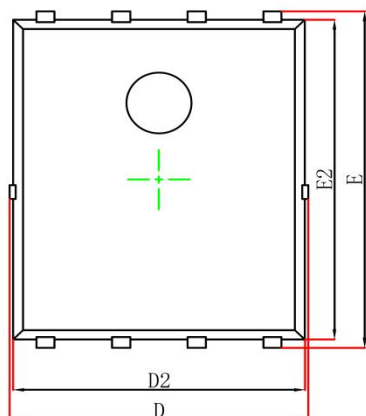


Maximum Transient Thermal Impedance

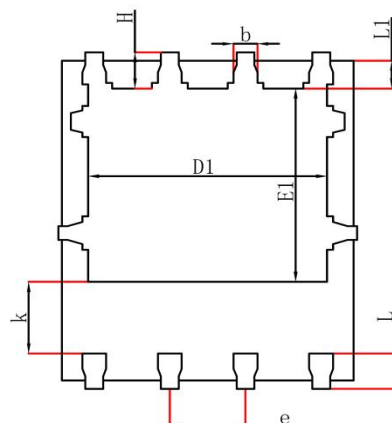


Safe Operation Area

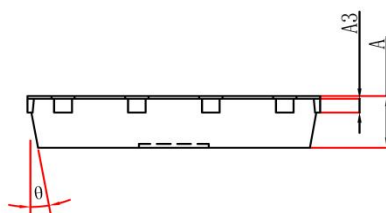
## PDFN5X6-8L Package Information



Top View  
[顶视图]



Bottom View  
[背视图]



Side View  
[侧视图]

| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.900                     | 1.000 | 0.035                | 0.039 |
| A3     | 0.254REF.                 |       | 0.010REF.            |       |
| D      | 4.944                     | 5.096 | 0.195                | 0.201 |
| E      | 5.974                     | 6.126 | 0.235                | 0.241 |
| D1     | 3.910                     | 4.110 | 0.154                | 0.162 |
| E1     | 3.375                     | 3.575 | 0.133                | 0.141 |
| D2     | 4.824                     | 4.976 | 0.190                | 0.196 |
| E2     | 5.674                     | 5.826 | 0.223                | 0.229 |
| k      | 1.190                     | 1.390 | 0.047                | 0.055 |
| b      | 0.350                     | 0.450 | 0.014                | 0.018 |
| e      | 1.270TYP.                 |       | 0.050TYP.            |       |
| L      | 0.559                     | 0.711 | 0.022                | 0.028 |
| L1     | 0.424                     | 0.576 | 0.017                | 0.023 |
| H      | 0.574                     | 0.726 | 0.023                | 0.029 |
| θ      | 10°                       | 12°   | 10°                  | 12°   |