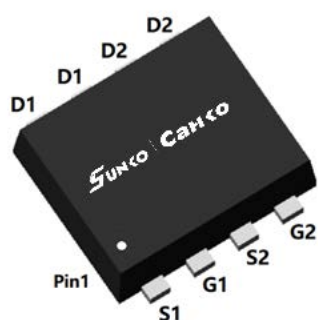
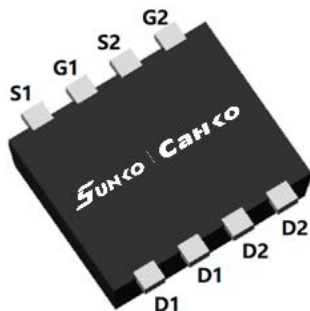


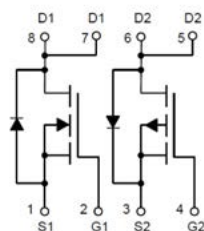
## N-Channel and P-Channel Complementary MOSFET



Top View



Bottom View



PDFN3030-8L

### Product Summary

#### NMOS

- $V_{DS}$  100V
- $I_D$  1A
- $R_{DS(ON)}$  ( at  $V_{GS}=10V$ )  $<270m\Omega$
- $R_{DS(ON)}$  ( at  $V_{GS}=4.5V$ )  $<344m\Omega$

#### PMOS

- $V_{DS}$  -100V
- $I_D$  -0.9A
- $R_{DS(ON)}$  ( at  $V_{GS}=-10V$ )  $<565m\Omega$
- $R_{DS(ON)}$  ( at  $V_{GS}=-4.5V$ )  $<640m\Omega$

### General Description

- Voltage controlled small signal switch
- Fast Switching Speed
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### Applications

- Power Management Functions
- Motor Control
- DC-DC convertor

### ■ Absolute Maximum Ratings ( $T_J=25^\circ C$ unless otherwise noted)

| Parameter                               |                                             |                       | Symbol                            | NMOS     | PMOS     | Unit |
|-----------------------------------------|---------------------------------------------|-----------------------|-----------------------------------|----------|----------|------|
| Drain-source Voltage                    |                                             |                       | V <sub>DS</sub>                   | 100      | -100     | V    |
| Gate-source Voltage                     |                                             |                       | V <sub>GS</sub>                   | ±20      | ±20      | V    |
| Continuous Drain Current<br>(Note 1,2 ) | Steady-State                                | T <sub>A</sub> =25°C  | I <sub>D</sub>                    | 1        | -0.9     | A    |
|                                         |                                             | T <sub>A</sub> =100°C |                                   | 0.63     | -0.57    |      |
| Pulsed Drain Current                    | T <sub>C</sub> =25°C, t <sub>p</sub> =100μs |                       | I <sub>DM</sub>                   | 8        | -7       | A    |
| Total Power Dissipation<br>(Note 1,2)   | Steady-State                                | T <sub>A</sub> =25°C  | P <sub>D</sub>                    | 1.19     | 1.13     | W    |
|                                         |                                             | T <sub>A</sub> =100°C |                                   | 0.47     | 0.45     |      |
| Junction and Storage Temperature Range  |                                             |                       | T <sub>J</sub> , T <sub>STG</sub> | -55~+150 | -55~+150 | °C   |

### ■ Thermal resistance

| Parameter                                          |              | Symbol          | NMOS |     | PMOS |     | Units        |
|----------------------------------------------------|--------------|-----------------|------|-----|------|-----|--------------|
|                                                    |              |                 | Typ  | Max | Typ  | Max |              |
| Thermal Resistance Junction-to-Ambient<br>(Note 2) | Steady-State | $R_{\theta JA}$ | 85   | 105 | 90   | 110 | $^\circ C/W$ |

### ■ Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking   | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-----------|----------------------|-------------------------|----------------------------|---------------|
| SCUA320NP10AJ | F1           | Q320NP10A | 3000                 | 30000                   | 120000                     | 7" reel       |

# SCUA320NP10AJ

## ■ NMOS Electrical Characteristics (T<sub>J</sub>=25℃ unless otherwise noted)

| Parameter                             | Symbol              | Conditions                                                                               | Min | Typ  | Max  | Units |
|---------------------------------------|---------------------|------------------------------------------------------------------------------------------|-----|------|------|-------|
| Static Parameter                      |                     |                                                                                          |     |      |      |       |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                              | 100 | -    | -    | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V                                               | -   | -    | 1    | μA    |
|                                       |                     | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, T <sub>j</sub> =150℃                         | -   | -    | 100  |       |
| Gate-Body Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V                                              | -   | -    | ±100 | nA    |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 1.3 | 1.8  | 2.3  | V     |
| Static Drain-Source On-Resistance     | R <sub>DS(on)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =1A                                                 | -   | 200  | 270  | mΩ    |
|                                       |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =1A                                                | -   | 215  | 344  |       |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =1A, V <sub>GS</sub> =0V                                                  | -   | -    | 1.2  | V     |
| Gate resistance                       | R <sub>G</sub>      | f=1MHz                                                                                   | -   | 1.7  | -    | Ω     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |                                                                                          | -   | -    | 1    | A     |
| Dynamic Parameters                    |                     |                                                                                          |     |      |      |       |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                        | -   | 330  | -    | pF    |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                          | -   | 12.5 | -    |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |                                                                                          | -   | 10.8 | -    |       |
| Switching Parameters                  |                     |                                                                                          |     |      |      |       |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =10V, V <sub>DS</sub> =50V, I <sub>D</sub> =2A                           | -   | 8.7  | -    | nC    |
| Gate-Source Charge                    | Q <sub>gs</sub>     |                                                                                          | -   | 0.5  | -    |       |
| Gate-Drain Charge                     | Q <sub>gd</sub>     |                                                                                          | -   | 0.87 | -    |       |
| Reverse Recovery Charge               | Q <sub>rr</sub>     | I <sub>F</sub> =2A, di/dt=100A/us                                                        | -   | 21.7 | -    | nC    |
| Reverse Recovery Time                 | t <sub>rr</sub>     |                                                                                          | -   | 20.5 | -    | ns    |
| Turn-on Delay Time                    | t <sub>D(on)</sub>  | V <sub>GS</sub> =10V, V <sub>DD</sub> =50V, I <sub>D</sub> =2A<br>R <sub>GEN</sub> =2.7Ω | -   | 5.5  | -    | ns    |
| Turn-on Rise Time                     | t <sub>r</sub>      |                                                                                          | -   | 3    | -    |       |
| Turn-off Delay Time                   | t <sub>D(off)</sub> |                                                                                          | -   | 15.7 | -    |       |
| Turn-off fall Time                    | t <sub>f</sub>      |                                                                                          | -   | 3.1  | -    |       |

# SCUA320NP10AJ

## ■ PMOS Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

| Parameter                             | Symbol              | Conditions                                                                                    | Min  | Typ  | Max  | Units |
|---------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|------|------|------|-------|
| Static Parameter                      |                     |                                                                                               |      |      |      |       |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> =-250μA                                                  | -100 | -    | -    | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V                                                   | -    | -    | -1   | μA    |
|                                       |                     | V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V, T <sub>j</sub> =150℃                             | -    | -    | -100 |       |
| Gate-Body Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V                                                   | -    | -    | ±100 | nA    |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA                                    | -1.2 | -1.7 | -2.2 | V     |
| Static Drain-Source On-Resistance     | R <sub>DS(on)</sub> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-0.5A                                                  | -    | 435  | 565  | mΩ    |
|                                       |                     | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.5A                                                 | -    | 475  | 640  |       |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =-0.5A, V <sub>GS</sub> =0V                                                    | -    | -    | -1.2 | V     |
| Gate resistance                       | R <sub>G</sub>      | f=1MHz                                                                                        | -    | 22   | -    | Ω     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |                                                                                               | -    | -    | -0.9 | A     |
| Dynamic Parameters                    |                     |                                                                                               |      |      |      |       |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =-50V, V <sub>GS</sub> =0V, f=1MHz                                            | -    | 486  | -    | pF    |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                               | -    | 13.3 | -    |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |                                                                                               | -    | 10.7 | -    |       |
| Switching Parameters                  |                     |                                                                                               |      |      |      |       |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-50V, I <sub>D</sub> =-0.5A                           | -    | 10.5 | -    | nC    |
| Gate-Source Charge                    | Q <sub>gs</sub>     |                                                                                               | -    | 0.74 | -    |       |
| Gate-Drain Charge                     | Q <sub>gd</sub>     |                                                                                               | -    | 1.33 | -    |       |
| Reverse Recovery Charge               | Q <sub>rr</sub>     | I <sub>F</sub> =-0.5A, di/dt=100A/us                                                          | -    | 18.3 | -    | nC    |
| Reverse Recovery Time                 | t <sub>rr</sub>     |                                                                                               | -    | 18.2 | -    | ns    |
| Turn-on Delay Time                    | t <sub>D(on)</sub>  | V <sub>GS</sub> =-10V, V <sub>DD</sub> =-50V, I <sub>D</sub> =-0.5A<br>R <sub>GEN</sub> =2.7Ω | -    | 5.2  | -    | ns    |
| Turn-on Rise Time                     | t <sub>r</sub>      |                                                                                               | -    | 25   | -    |       |
| Turn-off Delay Time                   | t <sub>D(off)</sub> |                                                                                               | -    | 50   | -    |       |
| Turn-off fall Time                    | t <sub>f</sub>      |                                                                                               | -    | 132  | -    |       |

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. The value of R<sub>θJA</sub> is measured with the device mounted on the 40mm\*40mm\*1.1mm single layer FR-4 PCB board with 1 in<sup>2</sup> pad of 2oz. Copper, in the still air environment with T<sub>A</sub> =25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

■ NMOS Typical Electrical and Thermal Characteristics Diagrams

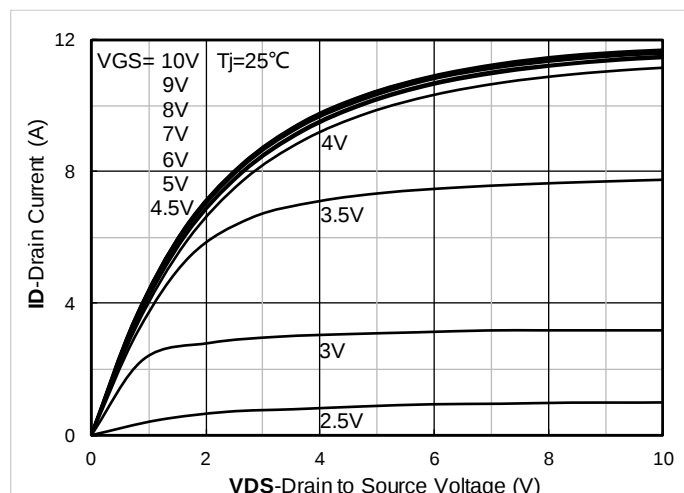


Figure 1. Output Characteristics

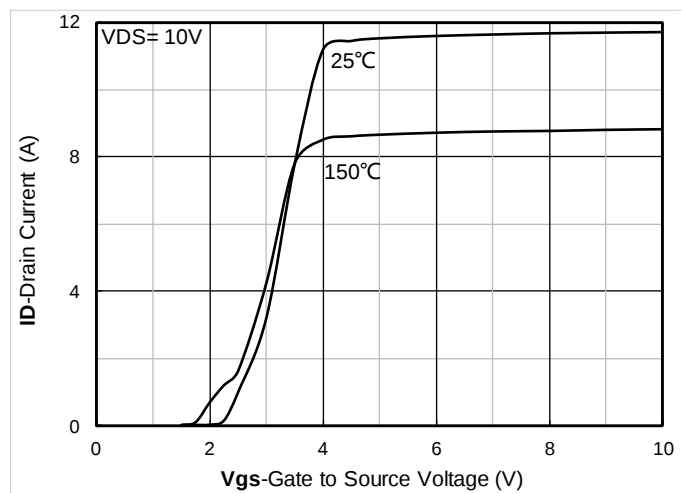


Figure 2. Transfer Characteristics

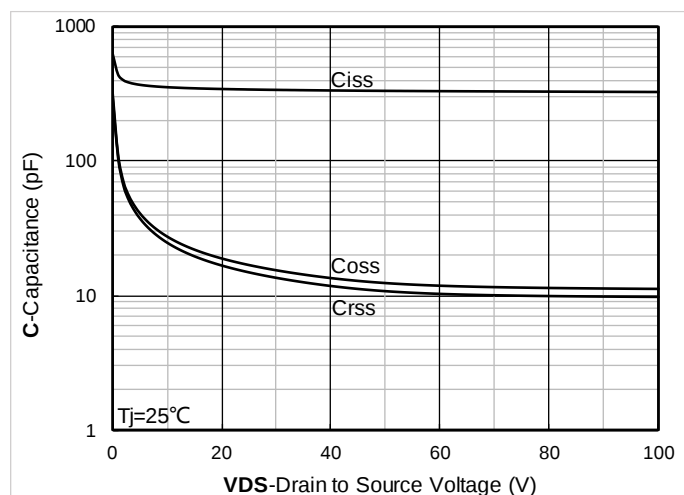


Figure 3. Capacitance Characteristics

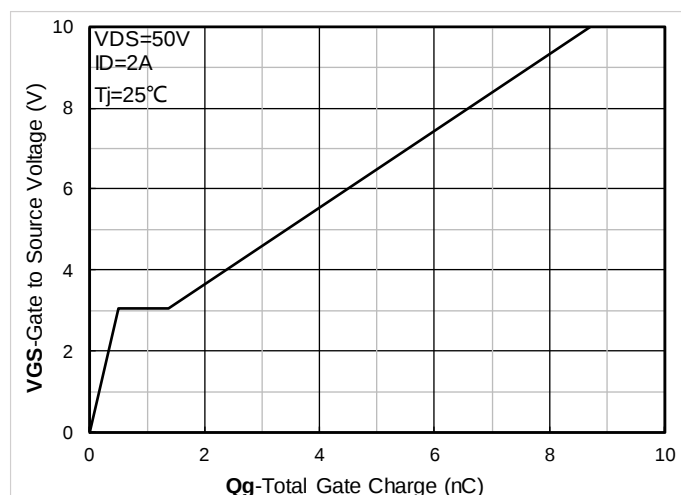


Figure 4. Gate Charge

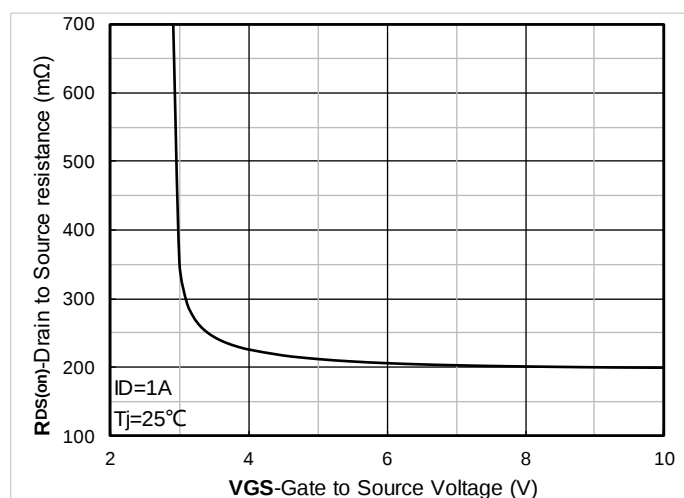


Figure 5. On-Resistance vs Gate to Source Voltage

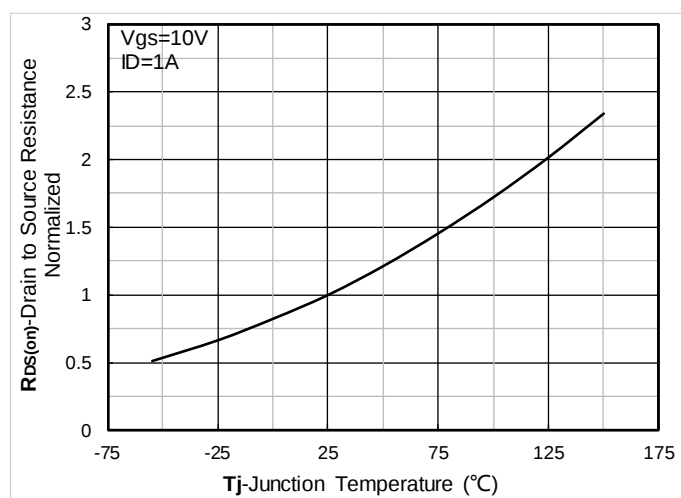


Figure 6. Normalized On-Resistance

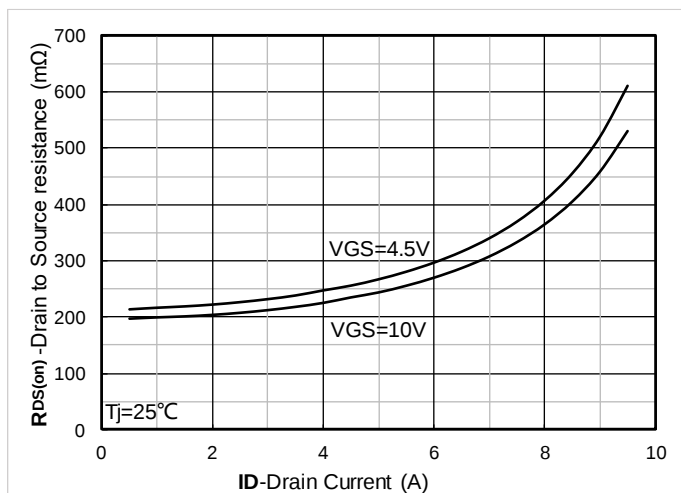


Figure 7.  $R_{DS(on)}$  VS Drain Current

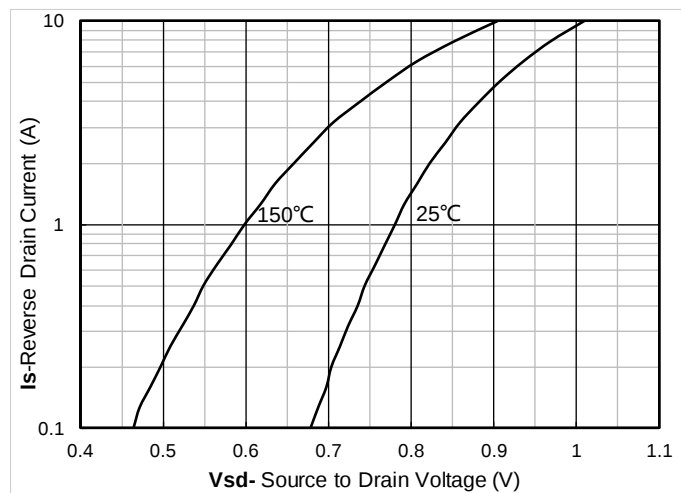


Figure 8. Forward characteristics of reverse diode

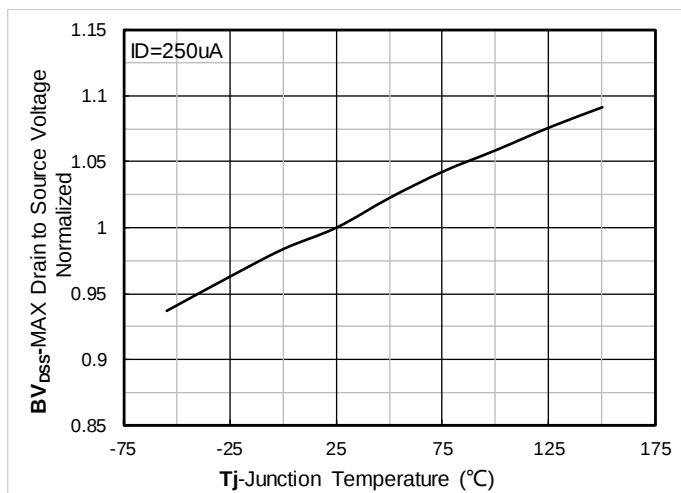


Figure 9. Normalized breakdown voltage

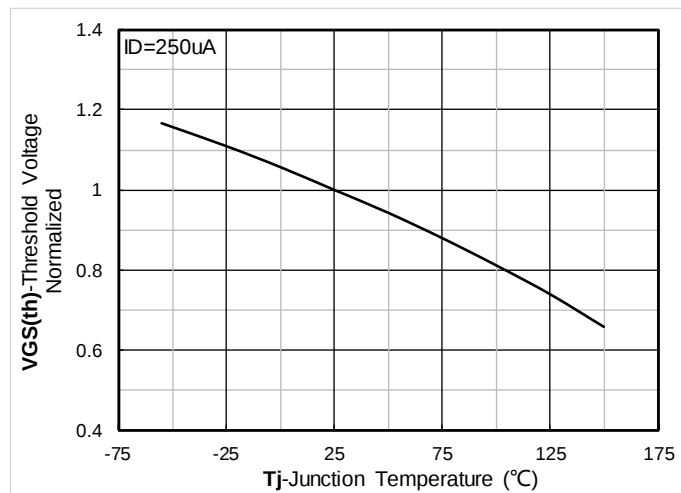


Figure 10. Normalized Threshold voltage

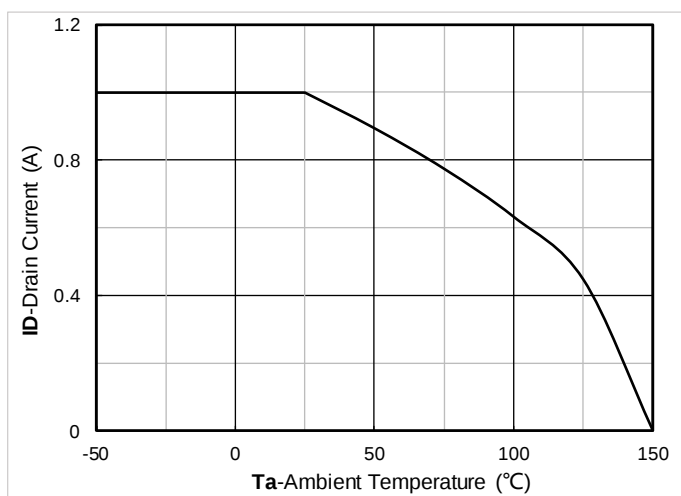


Figure 11. Current dissipation

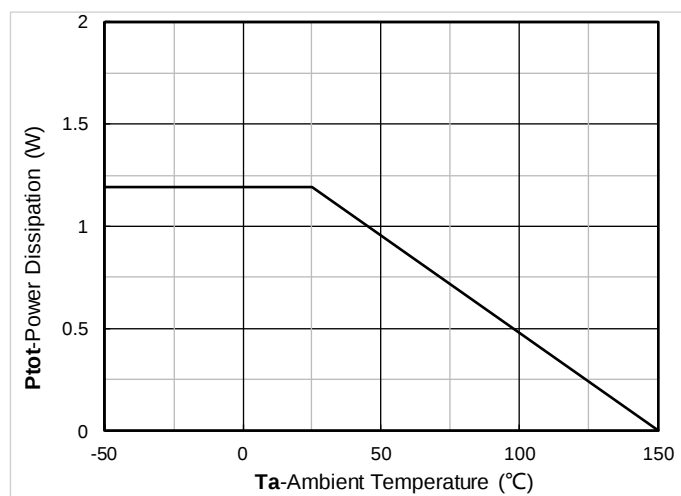


Figure 12. Power dissipation

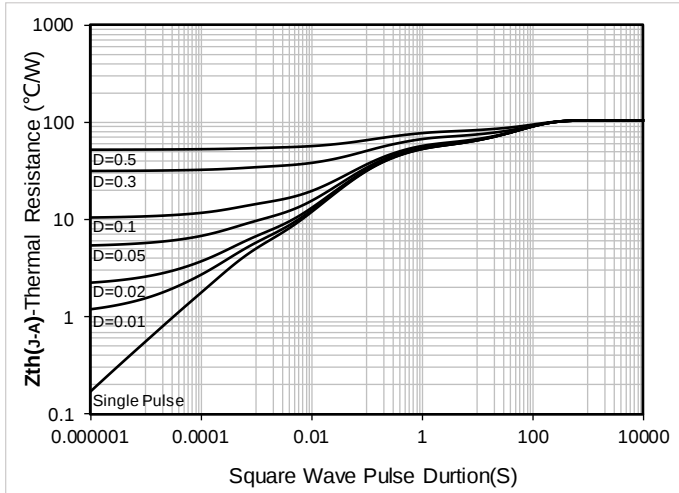


Figure 13. Maximum Transient Thermal Impedance

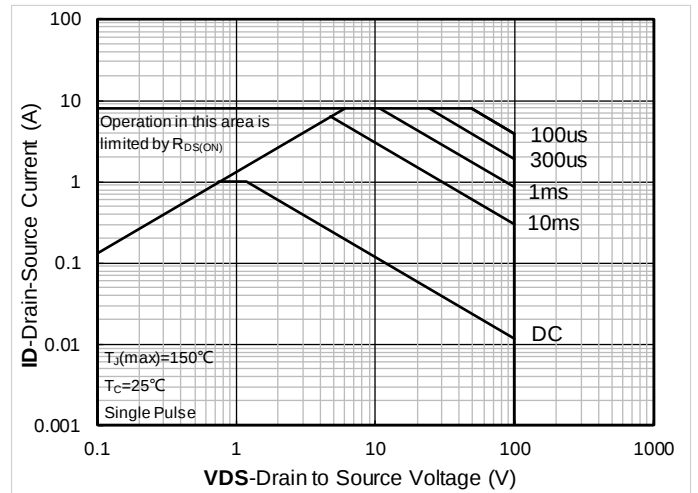


Figure 14. Safe Operation Area

## PMOS Typical Electrical and Thermal Characteristics Diagrams

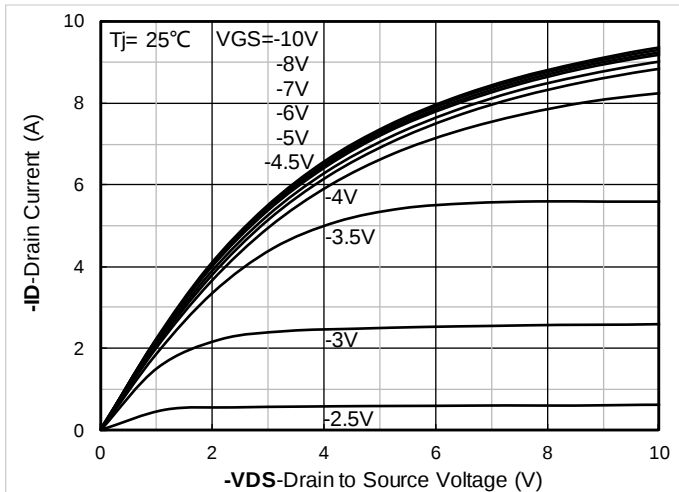


Figure 1. Output Characteristics

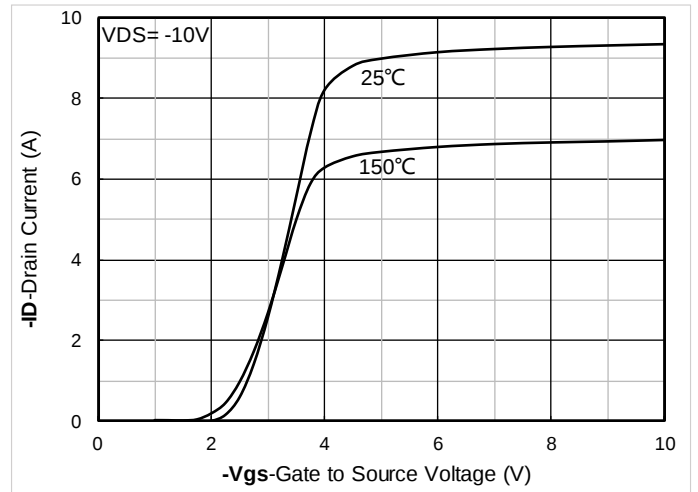


Figure 2. Transfer Characteristics

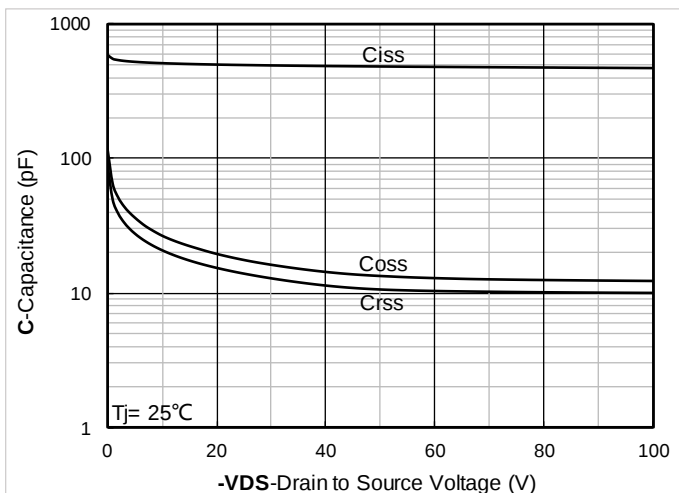


Figure 3. Capacitance Characteristics

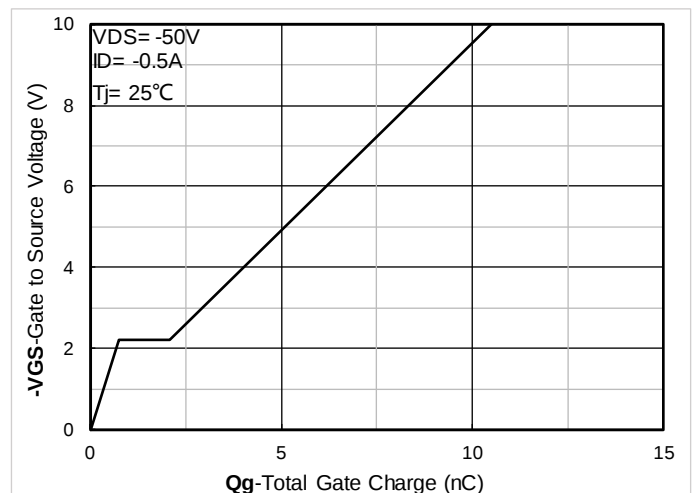


Figure 4. Gate Charge

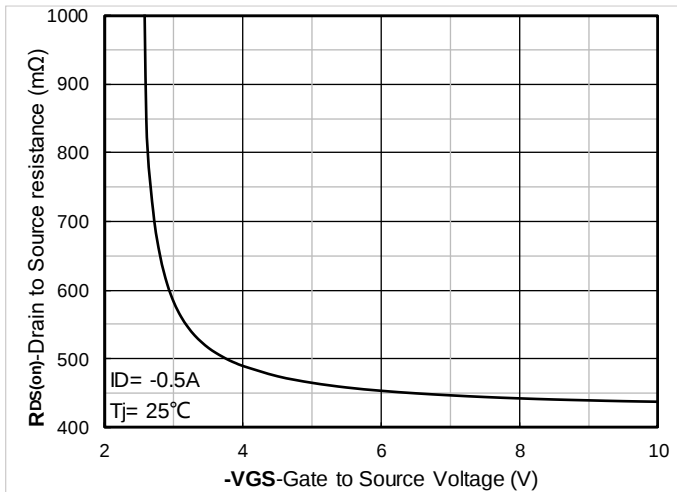


Figure 5. On-Resistance vs Gate to Source Voltage

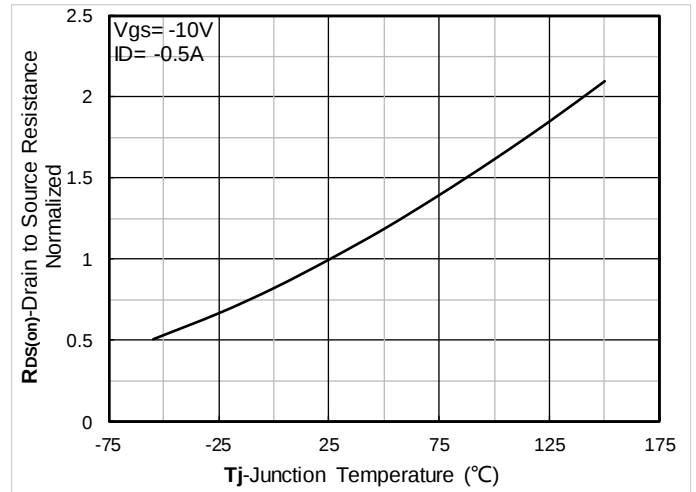


Figure 6. Normalized On-Resistance

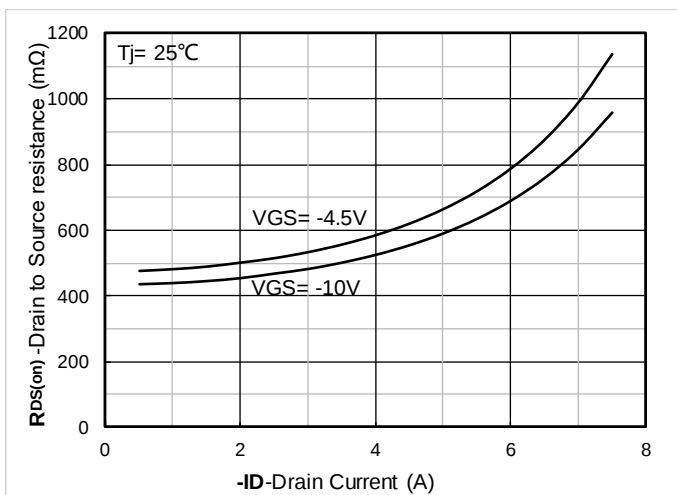


Figure 7.  $R_{DS(on)}$  VS Drain Current

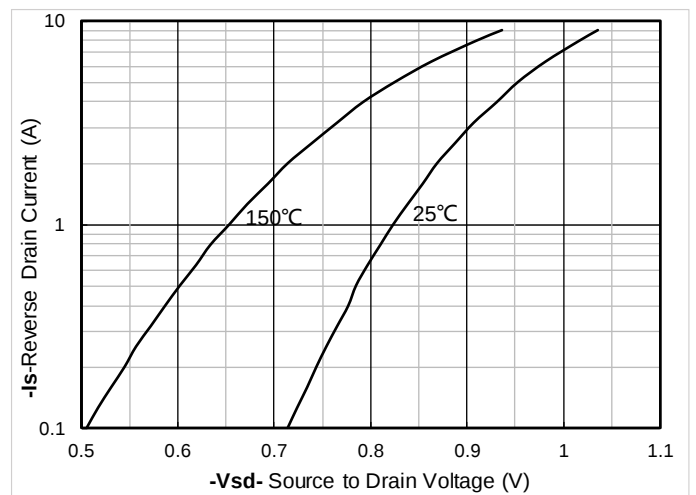


Figure 8. Forward characteristics of reverse diode

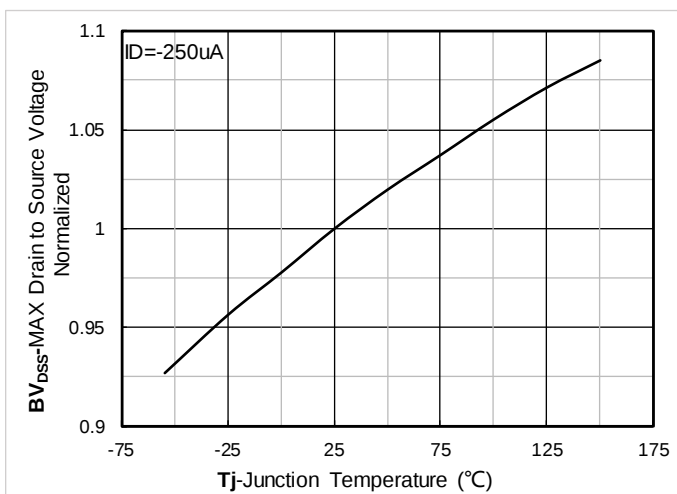


Figure 9. Normalized breakdown voltage

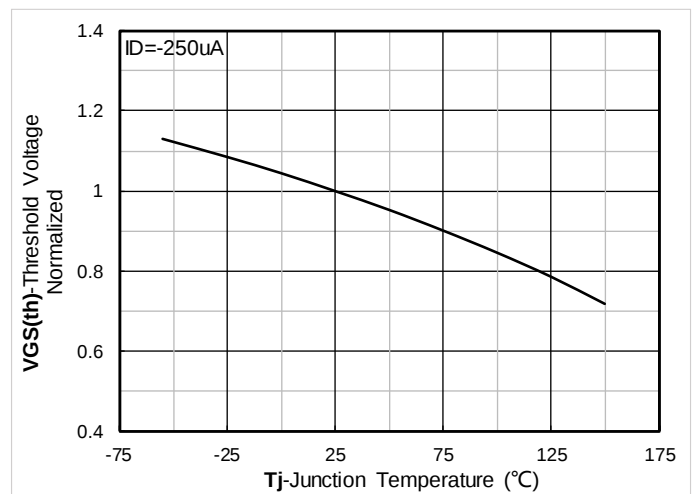


Figure 10. Normalized Threshold voltage

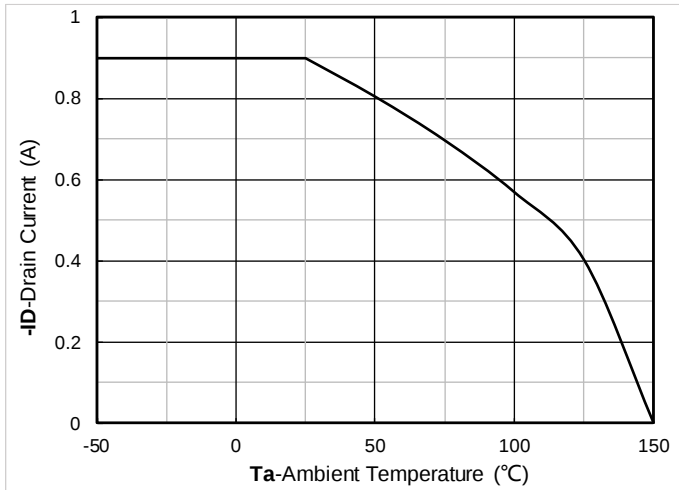


Figure 11. Current dissipation

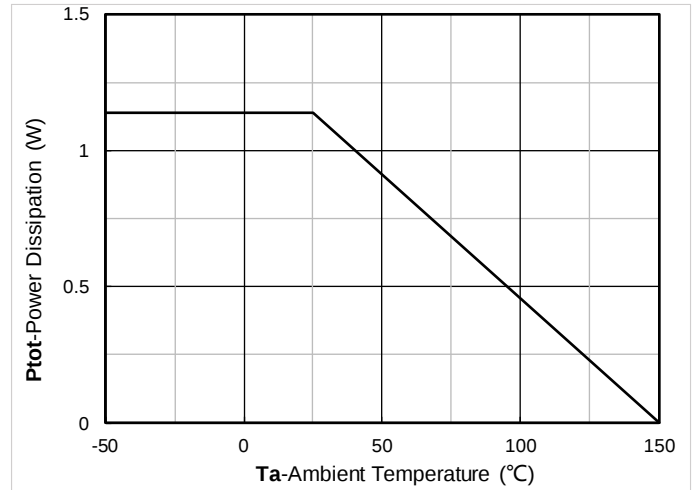


Figure 12. Power dissipation

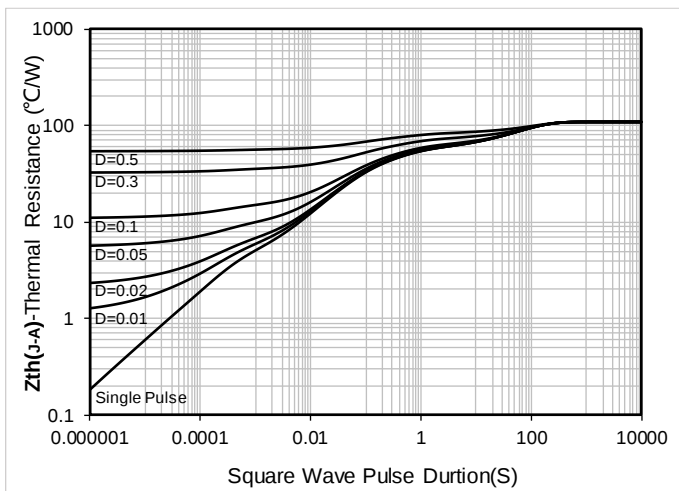


Figure 13. Maximum Transient Thermal Impedance

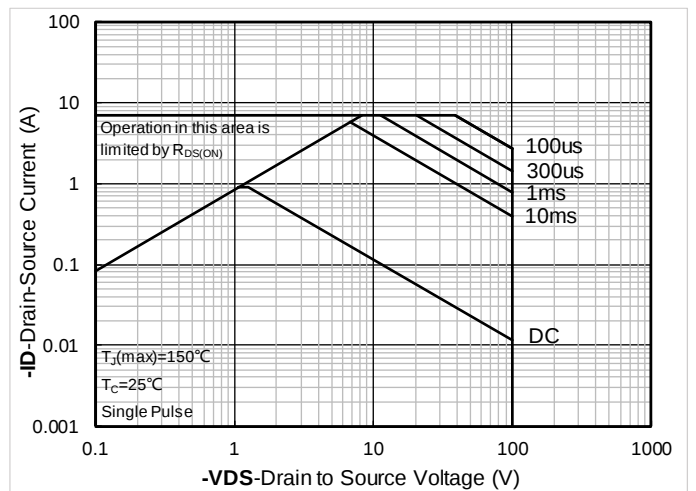
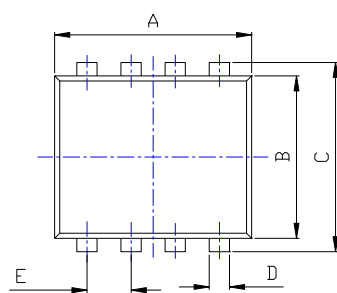
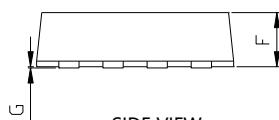


Figure 14. Safe Operation Area

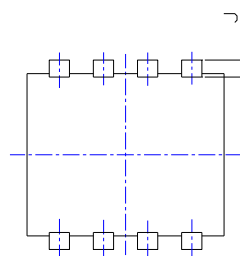
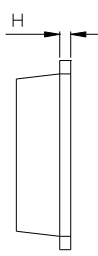
## ■ PDFN3030-8L Package information



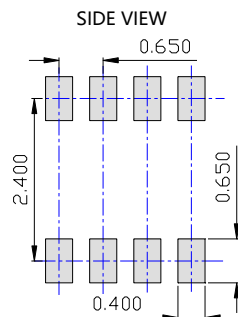
TOP VIEW



SIDE VIEW



BOTTOM VIEW



SUGGESTED SOLDER PAD LAYOUT

UNIT: mm

| SYMBOL | DIMENSIONS |       |            |       |
|--------|------------|-------|------------|-------|
|        | INCHES     |       | Millimeter |       |
|        | MIN.       | MAX.  | MIN.       | MAX.  |
| A      | 0.108      | 0.120 | 2.750      | 3.050 |
| B      | 0.089      | 0.100 | 2.250      | 2.550 |
| C      | 0.104      | 0.116 | 2.650      | 2.950 |
| D      | 0.008      | 0.016 | 0.200      | 0.400 |
| E      | 0.026 TYP  |       | 0.650 TYP  |       |
| F      | 0.028      | 0.035 | 0.700      | 0.900 |
| G      | 0.000      | 0.004 | 0.000      | 0.100 |
| H      | 0.004      | 0.012 | 0.100      | 0.300 |
| J      | 0.007      | 0.015 | 0.190      | 0.390 |

### NOTE:

1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.
2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.
3. THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.

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