

## N-channel Enhancement Mode MOSFET

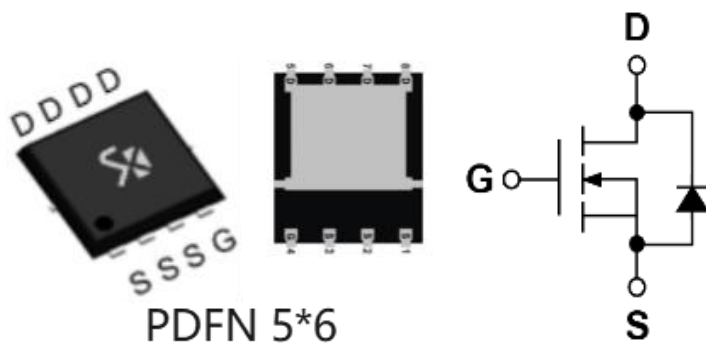
### Features

- ROHS Compliant & Halogen-Free
- Lower Qg and Qgd for high-speed switching
- Lower  $R_{DS(on)}$  to Minimize Conduction Losses
- 100% UIS and Rg Tested

### Applications

- Power Management in DC/DC Converters
- Power Load Switch
- Notebook Battery Management

|                             |                        |                       |
|-----------------------------|------------------------|-----------------------|
| $BV_{DSS}, T_A=25^{\circ}C$ | $I_D, T_A=25^{\circ}C$ | $R_{DS(on)}, typ@10V$ |
| 30 V                        | 70A                    | 3.4mΩ                 |



### Ordering Information

| Orderable Part Number | Package Type | Form        | Shipping           | Marking |
|-----------------------|--------------|-------------|--------------------|---------|
|                       | PDFN5*6      | Tape & Reel | 5000 / Tape & Reel |         |

### Absolute Maximum Ratings( $T_J=25^{\circ}C$ , Unless Otherwise Noted)

| Parameter                                      |                       | Symbol           | Value   | Unit |
|------------------------------------------------|-----------------------|------------------|---------|------|
| Drain-source Voltage                           |                       | V <sub>DS</sub>  | 30      | V    |
| Gate-source Voltage                            |                       | V <sub>GS</sub>  | ± 20    | V    |
| Drain Current-Continuous <sup>(2)</sup>        | T <sub>C</sub> =25°C  | I <sub>D</sub>   | 70      | A    |
|                                                | T <sub>C</sub> =100°C |                  | 50      | A    |
| Continuous Drain Current <sup>(1)</sup>        | T <sub>C</sub> =25°C  | I <sub>DM</sub>  | 70      | A    |
| Power Dissipation <sup>(2)</sup>               | T <sub>C</sub> =25°C  | P <sub>D</sub>   | 46      | W    |
|                                                | T <sub>C</sub> =100°C |                  | 18      | W    |
| Avalanche Current, Single pulse <sup>(3)</sup> | L=0.1mH               | I <sub>AS</sub>  | 31      | A    |
| Avalanche energy, single pulse <sup>(3)</sup>  | L=0.1mH               | E <sub>AS</sub>  | 48      | mJ   |
| Maximum Junction Temperature                   |                       | T <sub>J</sub>   | 150     | °C   |
| Storage Temperature Range                      |                       | T <sub>STG</sub> | -55~150 | °C   |

### Thermal Characteristics

| Parameter                                                    | Symbol          | Value | Unit          |
|--------------------------------------------------------------|-----------------|-------|---------------|
| Thermal Resistance, Junction to Case, Max.                   | $R_{\theta JC}$ | 2.7   | $^{\circ}C/W$ |
| Thermal Resistance, Junction to Ambient, Max. <sup>(3)</sup> | $R_{\theta JA}$ | 50    | $^{\circ}C/W$ |

### Electrical Characteristics( $T_J=25^{\circ}C$ )

| Parameter           | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------|--------|-----------|-----|-----|-----|------|
| Off Characteristics |        |           |     |     |     |      |

|                                                     |                     |                                                                                           |     |       |      |    |
|-----------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|-----|-------|------|----|
| Drain-source Breakdown voltage                      | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                | 30  |       |      | V  |
| Zero Gate Voltage Drain Current                     | I <sub>DSS</sub>    | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V                                                 |     |       | 1    | μA |
| Gate-source leakage current                         | I <sub>GSS</sub>    | V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V                                                |     |       | +100 | nA |
|                                                     |                     | V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V                                                |     |       | -100 | nA |
| On Characteristics                                  |                     |                                                                                           |     |       |      |    |
| Gate Threshold voltage                              | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 1.0 | 1.5   | 2    | V  |
| Static Drain to Source on resistance <sup>(4)</sup> | R <sub>DS(on)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                               |     | 3.4   | 4    | mΩ |
|                                                     |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A                                              |     | 4.5   | 6    | mΩ |
| Forward Transconductance                            | g <sub>fs</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =20A                                                  |     | 25.2  |      | S  |
| Dynamic Characteristics <sup>(5)</sup>              |                     |                                                                                           |     |       |      |    |
| Input Capacitance                                   | C <sub>iss</sub>    | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                         |     | 2435  |      | pF |
| Output Capacitance                                  | C <sub>oss</sub>    |                                                                                           |     | 308   |      | pF |
| Reverse Capacitance                                 | C <sub>rss</sub>    |                                                                                           |     | 259   |      | pF |
| Total Gate Charge                                   | Q <sub>g</sub>      | V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 4.5V                       |     | 33    |      | nC |
| Total Gate Charge                                   | Q <sub>g</sub>      | V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A,<br>V <sub>GS</sub> = 10V                     |     | 62    |      | nC |
| Gate to Source Charge                               | Q <sub>gs</sub>     |                                                                                           |     | 10.19 |      | nC |
| Gate to Drain “Miller” Charge                       | Q <sub>gd</sub>     |                                                                                           |     | 16.01 |      | nC |
| Internal Gate Resistance                            | R <sub>G</sub>      | f=1MHz, V <sub>DS</sub> =0V ,V <sub>GS</sub> =0V                                          |     | 1     |      | Ω  |
| Switching Characteristics                           |                     |                                                                                           |     |       |      |    |
| Turn-On Delay Time                                  | t <sub>d(on)</sub>  | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V,<br>R <sub>G</sub> = 3Ω, I <sub>D</sub> = 1A |     | 10.3  |      | nS |
| Turn-On Rise Time                                   | t <sub>r</sub>      |                                                                                           |     | 17.6  |      | nS |
| Turn-Off Delay Time                                 | t <sub>d(off)</sub> |                                                                                           |     | 43.2  |      | nS |
| Turn-Off Fall Time                                  | t <sub>f</sub>      |                                                                                           |     | 31.7  |      | nS |
| Source-Drain Diode Characteristics                  |                     |                                                                                           |     |       |      |    |
| Diode Forward Voltage <sup>(4)</sup>                | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =1A                                                   |     | 0.7   | 1.1  | V  |
| Reverse Recovery Time                               | t <sub>rr</sub>     | I <sub>F</sub> =1A, V <sub>GS</sub> =0                                                    |     | 20    |      | nS |
| Reverse Recovery Charge                             | Q <sub>rr</sub>     | dI <sub>F</sub> /dt=100A/μs                                                               |     | 12    |      | nC |

※Note:

(1)Max. current is limited by bonding wire

(2)UIS tested and pulse width are limited by maximum junction temperature 150°C

(3)Surface Mounted on 1in<sup>2</sup> FR-4 board with 1oz.

(4)Pulse test (pulse width 300us, duty cycle2%)

(5)Guaranteed by design, not subject to production testing.

## Typical Characteristics

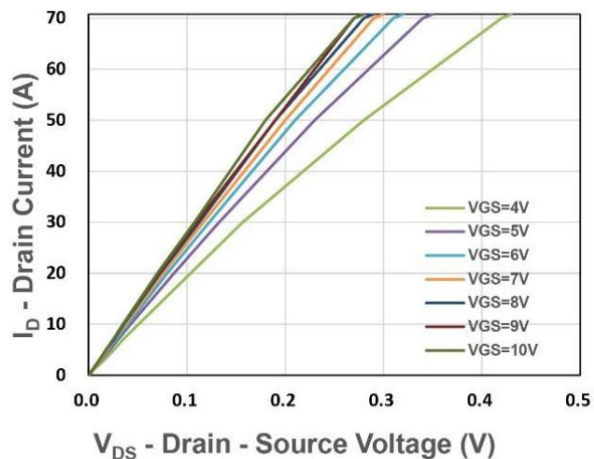


Figure 1. Output Characteristics

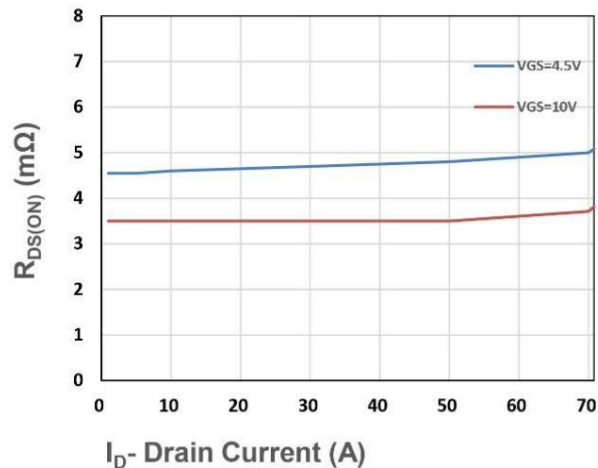


Figure 2. On-Resistance vs.  $I_D$

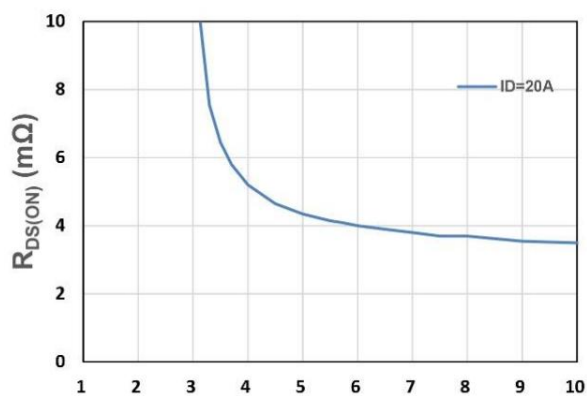


Figure 3. On-Resistance vs.  $V_{GS}$

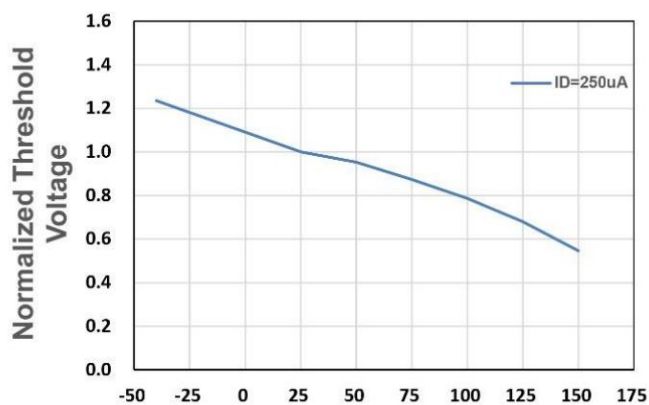


Figure 4. Gate Threshold Voltage

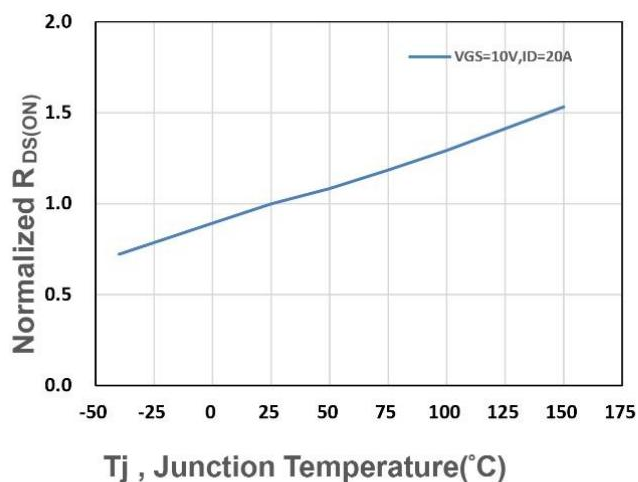


Figure 5. Drain-Source On Resistance

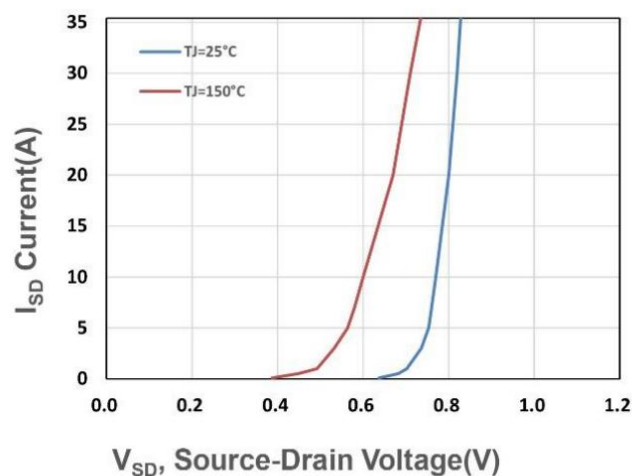
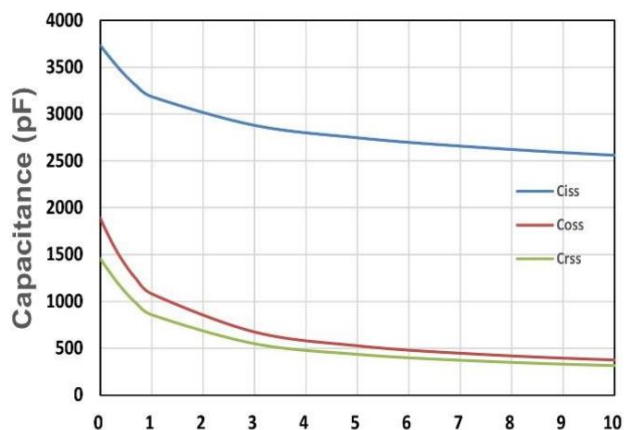
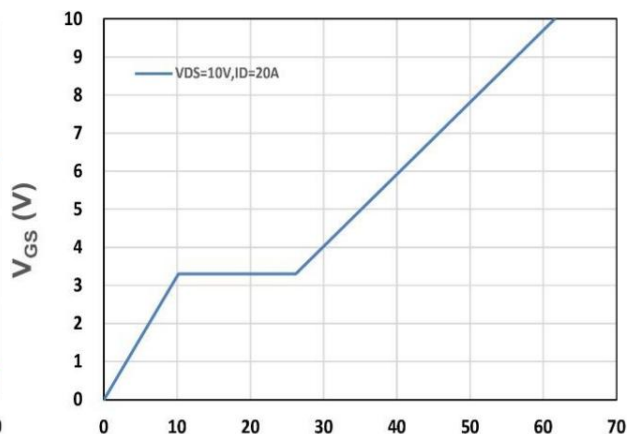


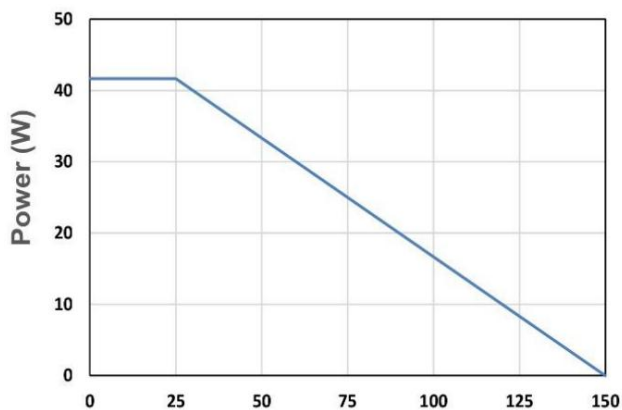
Figure 6. Source-Drain Diode Forward



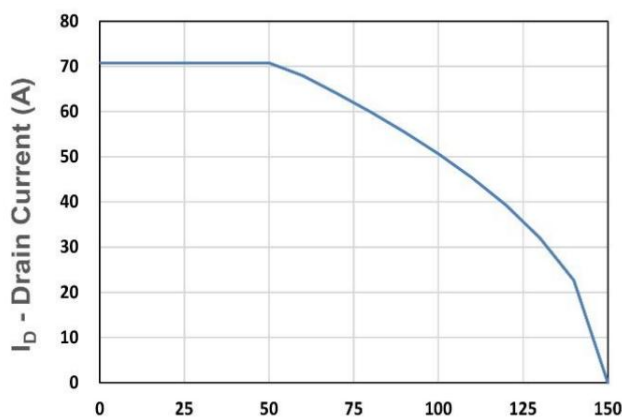
$V_{DS}$  - Drain - Source Voltage (V)  
Figure 7. Capacitance



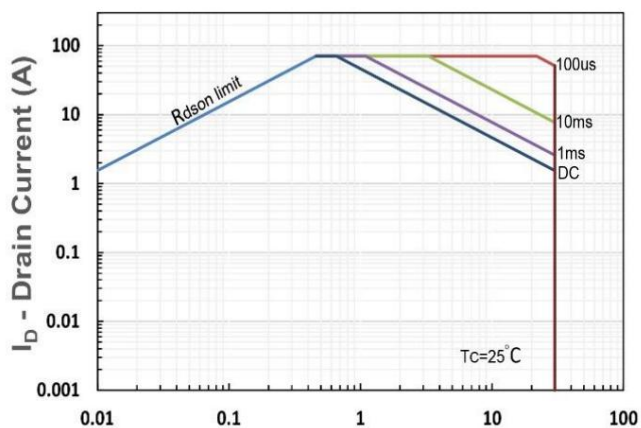
$Q_g$ , Total Gate Charge (nC)  
Figure 8. Gate Charge Characteristics



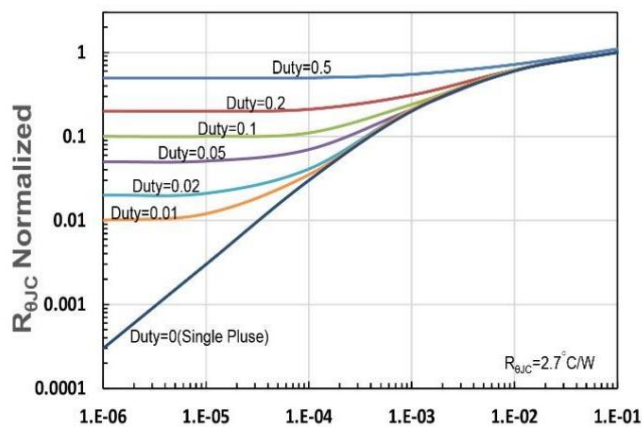
$T_C$  - Case Temperature (°C)  
Figure 9. Power Dissipation



$T_C$  - Case Temperature (°C)  
Figure 10. Drain Current



$V_{DS}$  - Drain-Source Voltage (V)  
Figure 11. Safe Operating Area

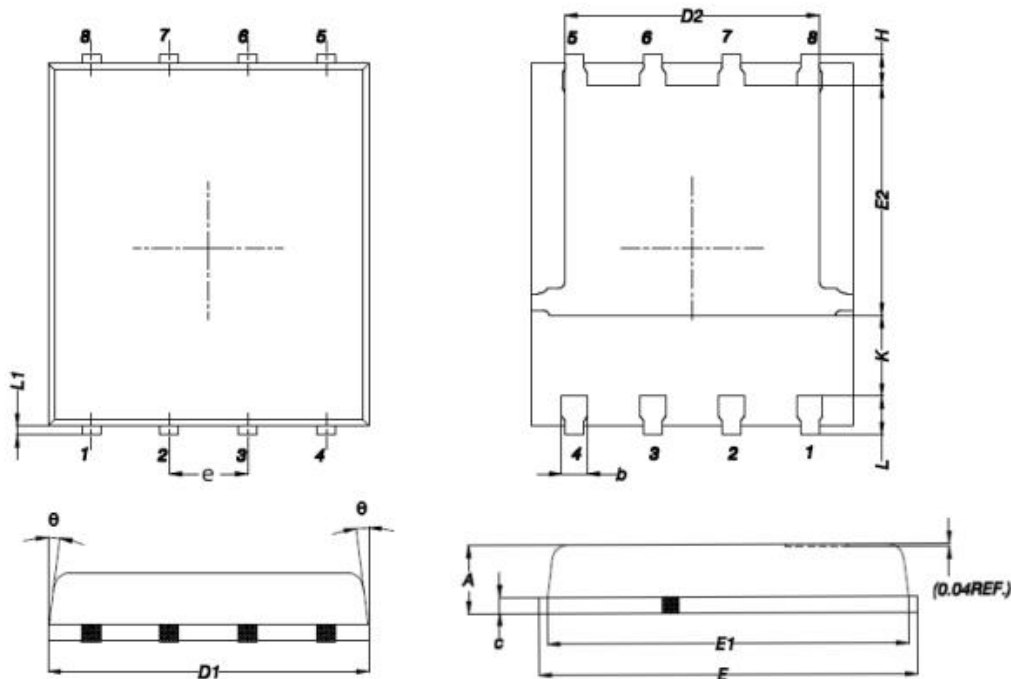


$t_1$ , Square Wave Pulse Duration(s)  
Figure 12.  $R_{\theta JC}$  Transient Thermal Impedance

## Package Information

PDFN 5\*6

Dimensions in mm



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | MAX                       | MIN   | MAX                  | MIN   |
| A      | 1.200                     | 0.850 | 0.047                | 0.031 |
| b      | 0.510                     | 0.300 | 0.020                | 0.012 |
| C      | 0.300                     | 0.200 | 0.012                | 0.008 |
| D1     | 5.400                     | 4.800 | 0.212                | 0.189 |
| D2     | 4.310                     | 3.610 | 0.170                | 0.142 |
| E      | 6.300                     | 5.850 | 0.248                | 0.230 |
| E1     | 5.960                     | 5.450 | 0.235                | 0.215 |
| E2     | 3.920                     | 3.300 | 0.154                | 0.130 |
| e      | 1.27BSC                   |       | 0.05BSC              |       |
| H      | 0.650                     | 0.380 | 0.026                | 0.015 |
| K      | ---                       | 1.100 | ---                  | 0.043 |
| L      | 0.710                     | 0.380 | 0.028                | 0.015 |
| L1     | 0.250                     | 0.050 | 0.009                | 0.002 |
| θ      | 12°                       | 0°    | 12°                  | 0°    |