

### Description

The 100N03NF is the high cell density trench N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 100N03NF meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

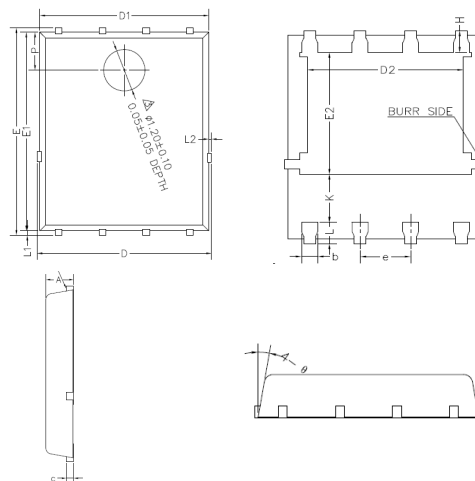
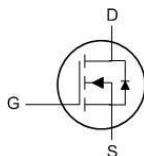
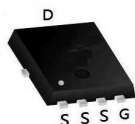
Super Low Gate Charge

100% EAS Guaranteed

Green Device Available

Excellent CdV/dt effect decline

Advanced high cell density Trench technology



PDFN5X6

### Product Summary

| BVDSS | RDSON | ID   |
|-------|-------|------|
| 30V   | 3.5mΩ | 100A |

### Dimensions In Millimeters

| SYMBOL | min  | max  | SYMBOL | min  | max  | SYMBOL | min | max |
|--------|------|------|--------|------|------|--------|-----|-----|
| A      | 0.95 | 1.20 | E      | 5.9  | 6.1  | L2     |     | 0.2 |
| b      | 0.25 | 0.40 | E1     | 5.7  | 5.8  | θ      |     | 13° |
| c      | 0.21 | 0.34 | E2     | 3.34 | 3.54 | P      | 1.0 | 1.2 |
| D      |      | 5.1  | H      | 0.51 | 0.71 |        |     |     |
| D1     | 4.8  | 5.0  | K      | 1.1  |      |        |     |     |
| D2     | 3.91 | 4.20 | L      | 0.51 | 0.71 |        |     |     |
| e      | 1.17 | 1.37 | L1     | 0.06 | 0.2  |        |     |     |

### Absolute Maximum Ratings

| Symbol                | Parameter                                  | Rating     |              | Units |
|-----------------------|--------------------------------------------|------------|--------------|-------|
|                       |                                            | 10s        | Steady State |       |
| $V_{DS}$              | Drain-Source Voltage                       | 30         |              | V     |
| $V_{GS}$              | Gate-Source Voltage                        | $\pm 20$   |              | V     |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 100        |              | A     |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 50         |              | A     |
| $I_D@T_A=25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 30         | 19           | A     |
| $I_D@T_A=70^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V^1$ | 25         | 16           | A     |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>          | 162        |              | A     |
| EAS                   | Single Pulse Avalanche Energy <sup>3</sup> | 144.7      |              | mJ    |
| $I_{AS}$              | Avalanche Current                          | 53.8       |              | A     |
| $P_D@T_C=25^\circ C$  | Total Power Dissipation <sup>4</sup>       | 62.5       |              | W     |
| $P_D@T_A=25^\circ C$  | Total Power Dissipation <sup>4</sup>       | 6          | 2.42         | W     |
| $T_{STG}$             | Storage Temperature Range                  | -55 to 175 |              | °C    |
| $T_J$                 | Operating Junction Temperature Range       | -55 to 175 |              | °C    |

### Thermal Data

| Symbol          | Parameter                                                  | Typ. | Max. | Unit |
|-----------------|------------------------------------------------------------|------|------|------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup>           | ---  | 62   | °C/W |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤ 10s) | ---  | 25   | °C/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>              | ---  | 2.4  | °C/W |

# 100N03NF

**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

| Symbol               | Parameter                                                 | Test Condition                                                                              | Min. | Typ. | Max. | Units |
|----------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------|------|------|------|-------|
| V <sub>(BR)DSS</sub> | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                  | 30   | -    | -    | V     |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =30V, V <sub>GS</sub> = 0V,                                                 | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>     | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V                                                 | -    | -    | ±100 | nA    |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                   | 1.0  | 1.5  | 2.5  | V     |
| R <sub>DS(on)</sub>  | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                                   | -    | 3.5  | 4.7  | mΩ    |
|                      |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                                  | -    | 7.0  | 10   |       |
| C <sub>iss</sub>     | Input Capacitance                                         | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V,<br>f = 1.0MHz                                    | -    | 2100 | -    | pF    |
| C <sub>oss</sub>     | Output Capacitance                                        |                                                                                             | -    | 326  | -    | pF    |
| C <sub>rss</sub>     | Reverse Transfer Capacitance                              |                                                                                             | -    | 282  | -    | pF    |
| Q <sub>g</sub>       | Total Gate Charge                                         | V <sub>DS</sub> =15V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V                          | -    | 45   | -    | nC    |
| Q <sub>gs</sub>      | Gate-Source Charge                                        |                                                                                             | -    | 3    | -    | nC    |
| Q <sub>gd</sub>      | Gate-Drain(“Miller”) Charge                               |                                                                                             | -    | 15   | -    | nC    |
| t <sub>d(on)</sub>   | Turn-on Delay Time                                        | V <sub>DS</sub> =15V,<br>I <sub>D</sub> =30A, R <sub>GEN</sub> =3Ω,<br>V <sub>GS</sub> =10V | -    | 21   | -    | ns    |
| t <sub>r</sub>       | Turn-on Rise Time                                         |                                                                                             | -    | 32   | -    | ns    |
| t <sub>d(off)</sub>  | Turn-off Delay Time                                       |                                                                                             | -    | 59   | -    | ns    |
| t <sub>f</sub>       | Turn-off Fall Time                                        |                                                                                             | -    | 34   | -    | ns    |
| I <sub>S</sub>       | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                             | -    | -    | 50   | A     |
| I <sub>SM</sub>      | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                             | -    | -    | 200  | A     |
| V <sub>SD</sub>      | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> = 0V, I <sub>S</sub> =30A                                                   | -    | -    | 1.2  | V     |
| t <sub>rr</sub>      | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =20A, dI/dt=100A/μs                                                          | -    | 15   | -    | ns    |
| Q <sub>rr</sub>      | Body Diode Reverse Recovery Charge                        |                                                                                             | -    | 4    | -    | nC    |

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_G=10V$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ ,  $I_{AS}=18.4A$

3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

RATING AND CHARACTERISTIC CURVES (100N03NF)

Figure1: Output Characteristics

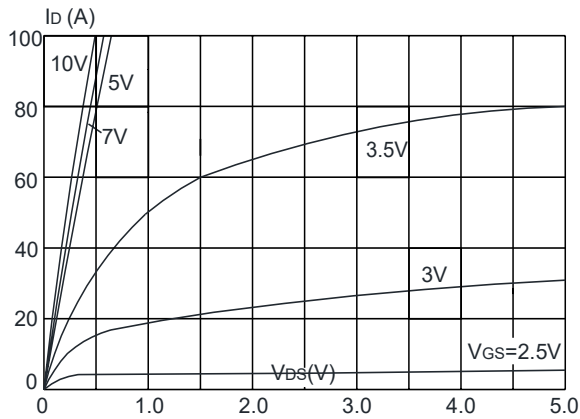


Figure 2: Typical Transfer Characteristics

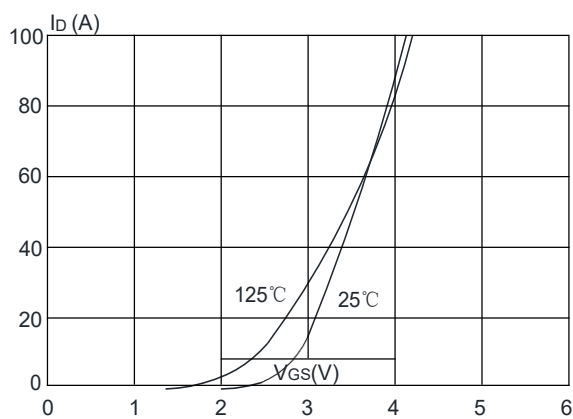


Figure 3: On-resistance vs. Drain Current

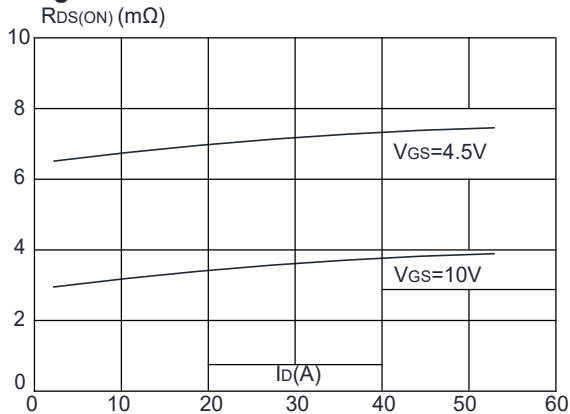


Figure 4: Body Diode Characteristics

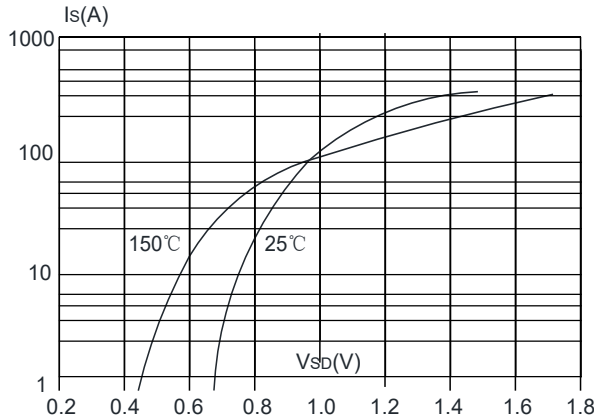


Figure 5: Gate Charge Characteristics

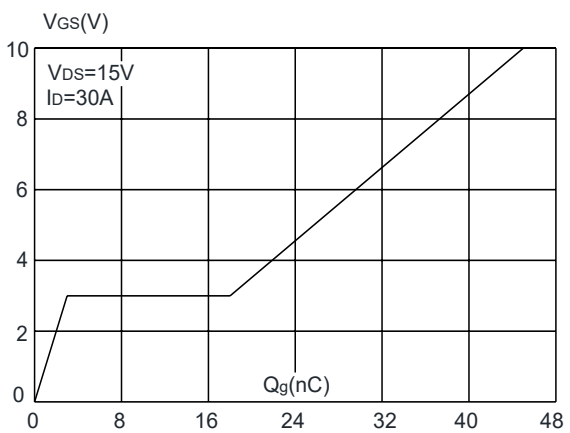
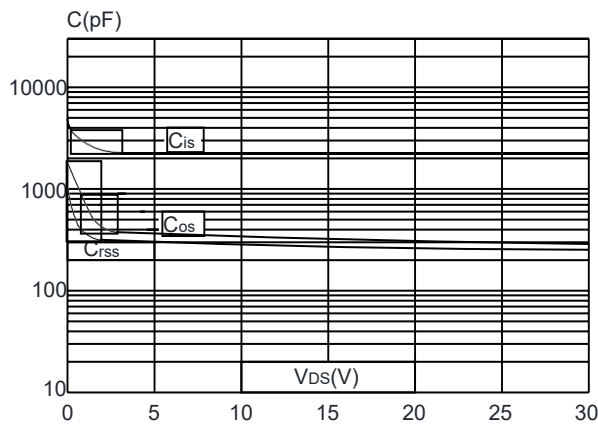


Figure 6: Capacitance Characteristics



RATING AND CHARACTERISTIC CURVES (100N03NF)

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

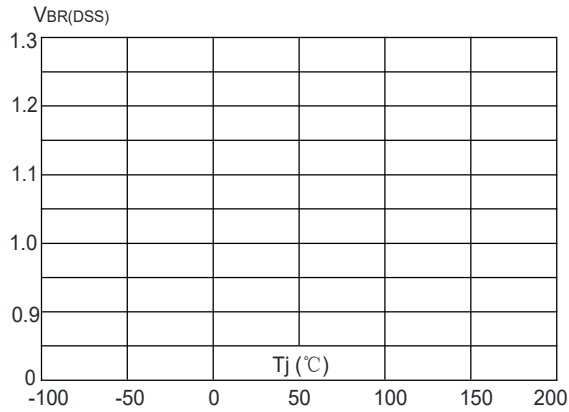


Figure 8: Normalized on Resistance vs. Junction Temperature

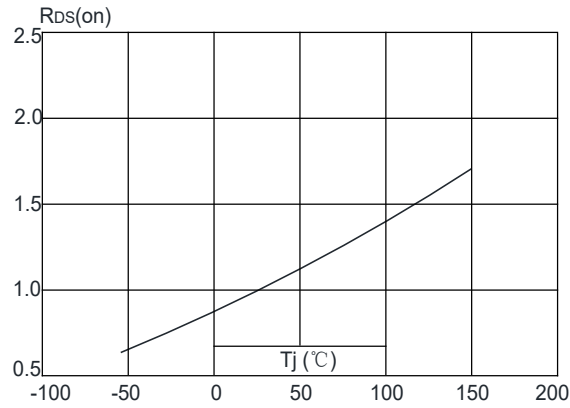


Figure 9: Maximum Safe Operating Area

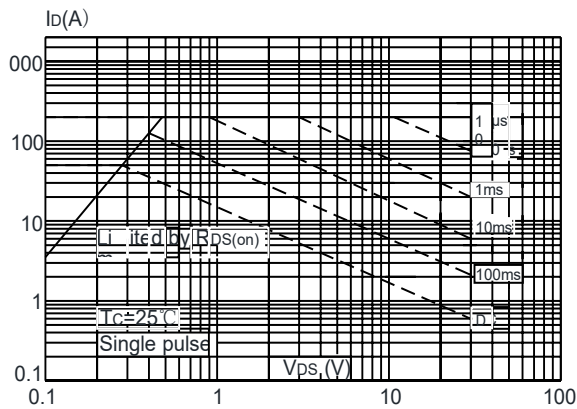


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

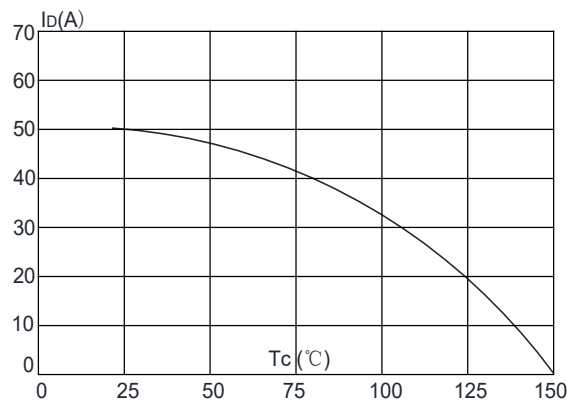
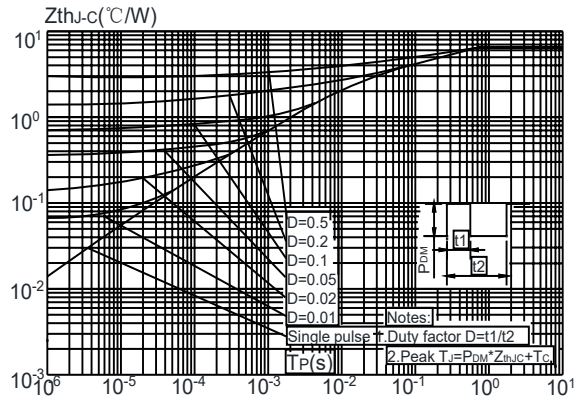


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case (PDFN3.3\*3.3-8L)





Test Circuit

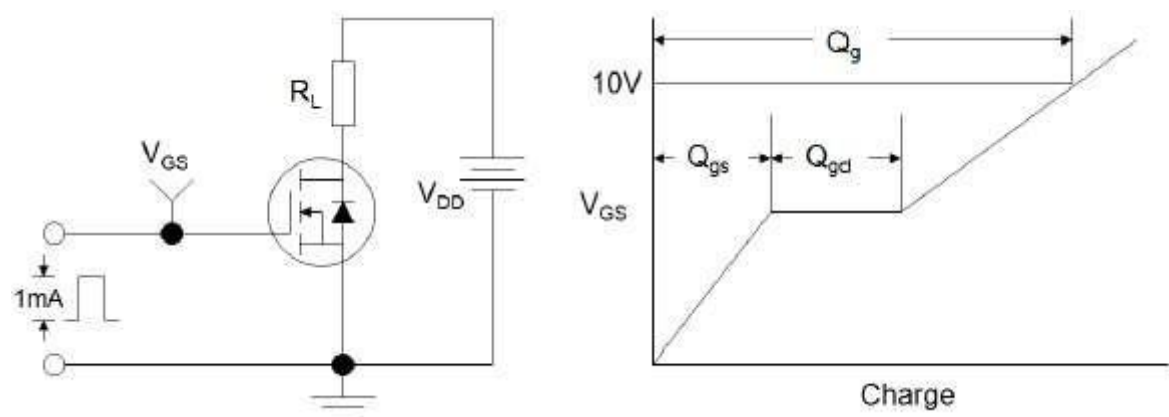


Figure1:Gate Charge Test Circuit & Waveform

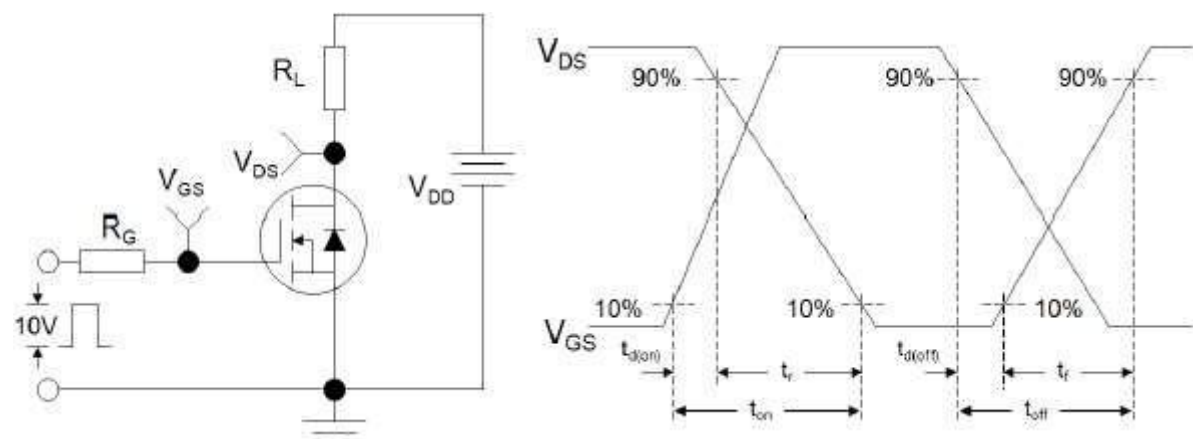


Figure 2: Resistive Switching Test Circuit & Waveforms

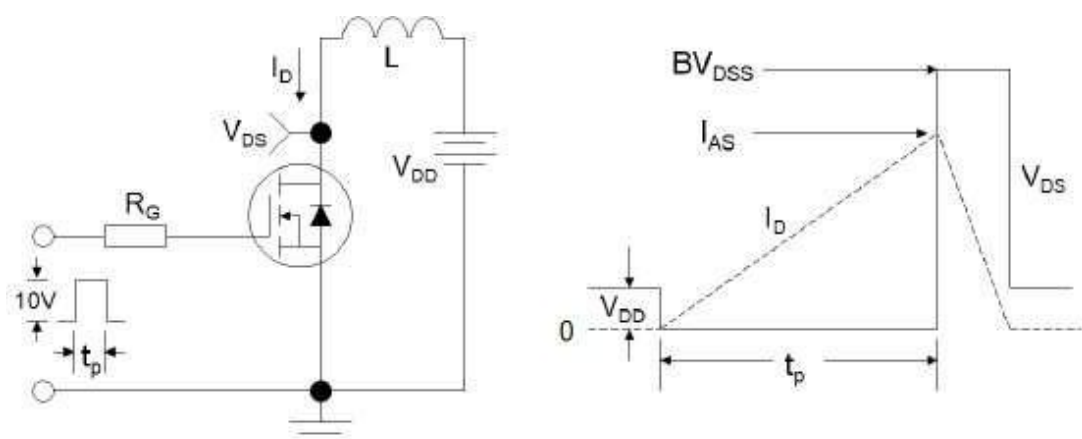


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms