- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

## Product Summary

RoHS

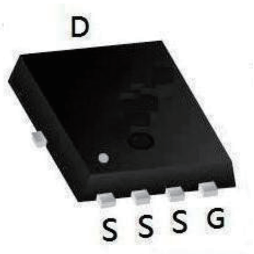
| BVDSS | RDSON | ID |
|---|---|---|
| 30V | 7mΩ | 50A |

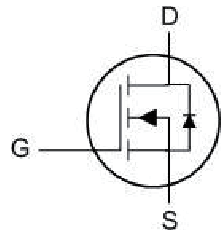
## Description

The 50N03D is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 50N03D meet the RoHS and Green Product, requirement 100% EAS guaranteed with full function reliability approved.

## PDFN3*3 Pin Configuration




## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25°C | Continuous Drain Current, VGS @ 10V[1] | 50 | A |
| $I_D$@$T_C$=100°C | Continuous Drain Current, VGS @ 10V[1] | 30 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 120 | A |
| $E_{AS}$ | Single Pulse Avalanche Energy[3] | 39 | mJ |
| $I_{AS}$ | Avalanche Current | 50 | A |
| $P_D$@$T_C$=25°C | Total Power Dissipation[4] | 18 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | °C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | °C |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{θJA}$ | Thermal Resistance Junction-ambient [1] | --- | 75 | °C/W |
| $R_{θJC}$ | Thermal Resistance Junction-Case [1] | --- | 4.32 | °C/W |

## Electrical Characteristics ($T_J$ =25 °C unless otherwise specified)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V , $I_D$=250uA | 30 | - | – | V |
| $\triangle BV_{DSS}/\triangle T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | - | 0.027 | – | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V , $I_D$=12A | - | 7 | 8.5 | mΩ |
| | | $V_{GS}$=4.5V , $I_D$=10A | - | 10 | 14 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | | 1 | - | 2.5 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | - | -5.8 | – | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=25℃ | - | - | 1 | uA |
| | | $V_{DS}$=24V , $V_{GS}$=0V , $T_J$=55℃ | - | - | 5 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$= ±20V , $V_{DS}$=0V | - | - | ±100 | nA |
| $R_g$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | - | 1.7 | – | Ω |
| $Q_g$ | Total Gate Charge (4.5V) | $V_{DS}$=20V , $V_{GS}$=4.5V , $I_D$=12A | - | 12.8 | – | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 3.3 | – | |
| $Q_{gd}$ | Gate-Drain Charge | | - | 6.5 | – | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=12V , $V_{GS}$=10V , $R_G$=3.3Ω $I_D$=5A | - | 4.5 | – | ns |
| $T_r$ | Rise Time | | - | 10.8 | – | |
| $T_{d(off)}$ | Turn-Off Delay Time | | - | 25.5 | – | |
| $T_f$ | Fall Time | | - | 9.6 | – | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V , $V_{GS}$=0V , f=1MHz | - | 1200 | – | pF |
| $C_{oss}$ | Output Capacitance | | - | 163 | – | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 131 | – | |

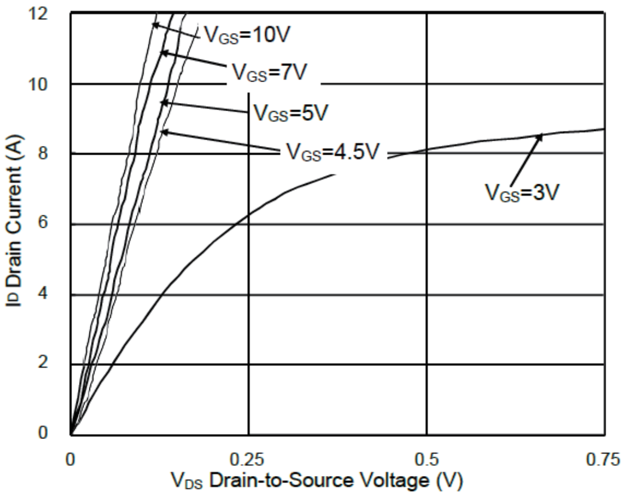
## Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,6] | $V_G$=$V_D$=0V , Force Current | - | - | 50 | A |
| $I_{SM}$ | Pulsed Source Current [2,6] | | - | - | 120 | A |
| $V_{SD}$ | Diode Forward Voltage [2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | - | - | 1.2 | V |

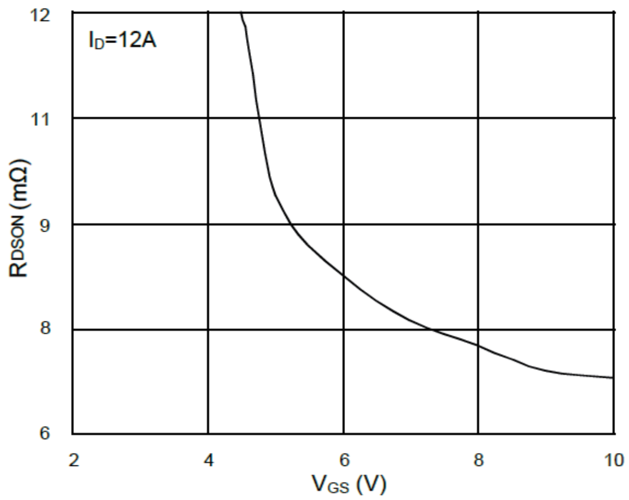
Note :
1.The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH,$I_{AS}$=34A
4.The power dissipation is limited by 150°C junction temperature
5.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Performance Characteristics

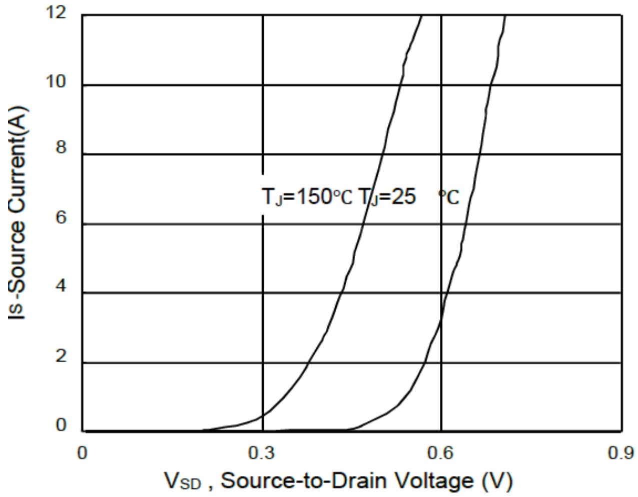
### Figure1: Output Characteristics



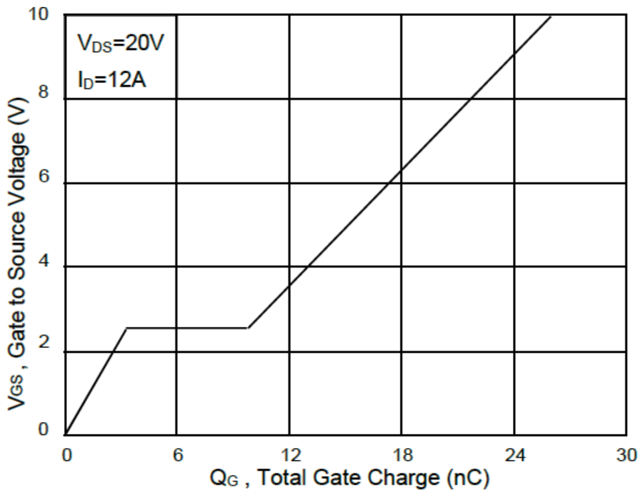

### Figure 2: On-Resistance vs. G-S Voltage



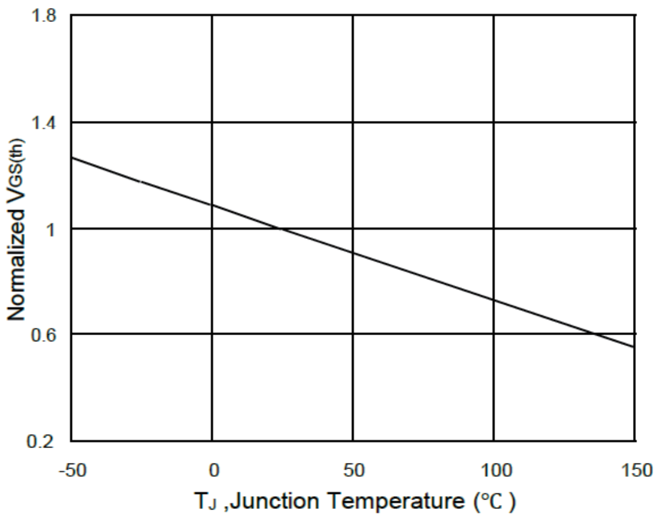

### Figure 3:Forward Characteristics of Rever



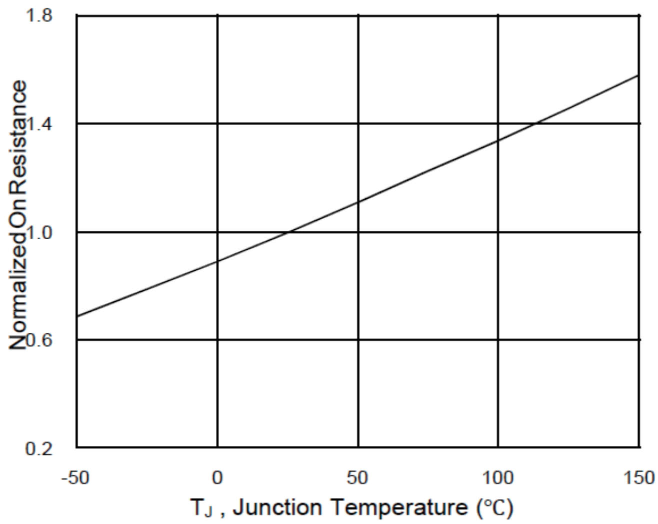

### Figure 4: Gate-Charge Characteristics




### Figure 5: Normalized VGS(th) vs. TJ

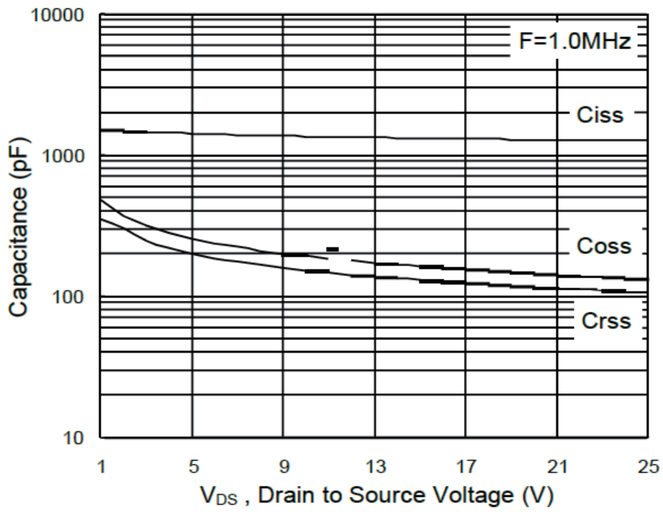



### Figure 6: Normalized RDSON vs.TJ

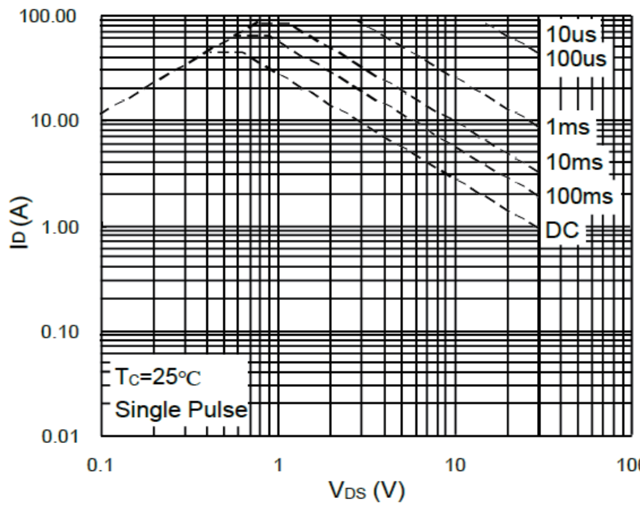


## Typical Performance Characteristics

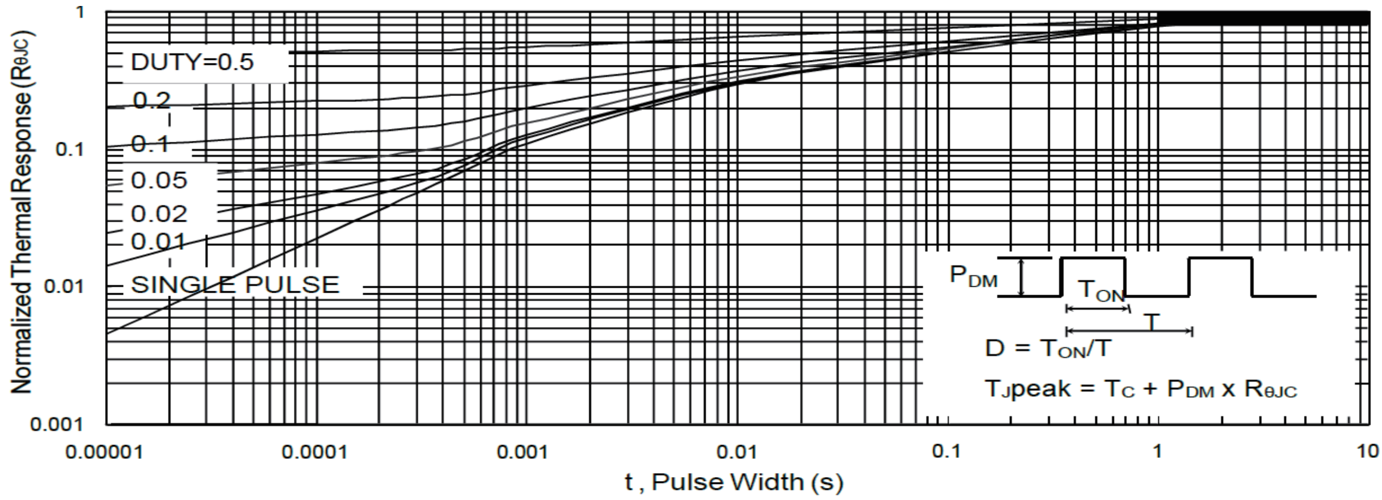
### Figure 7: Capacitances. Junction Temper



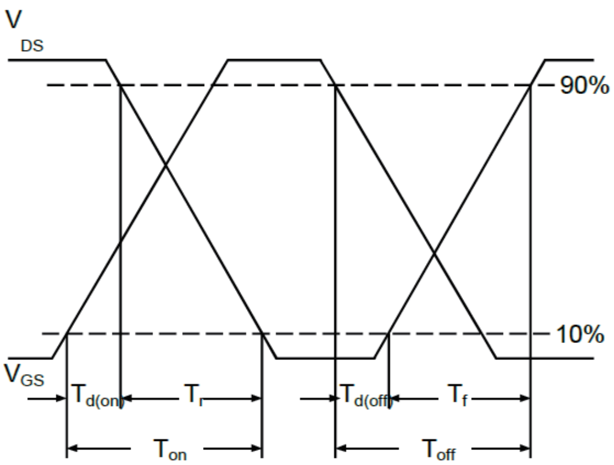

### Figure 8: Safe Operating Area




### Figure 9: Normalized Maximum Transient

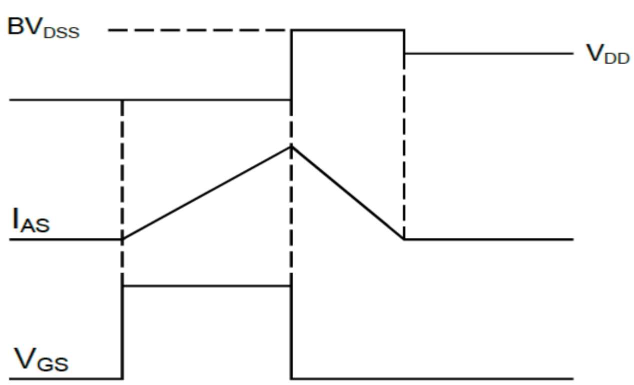



### Figure 10: Switching Time Waveform

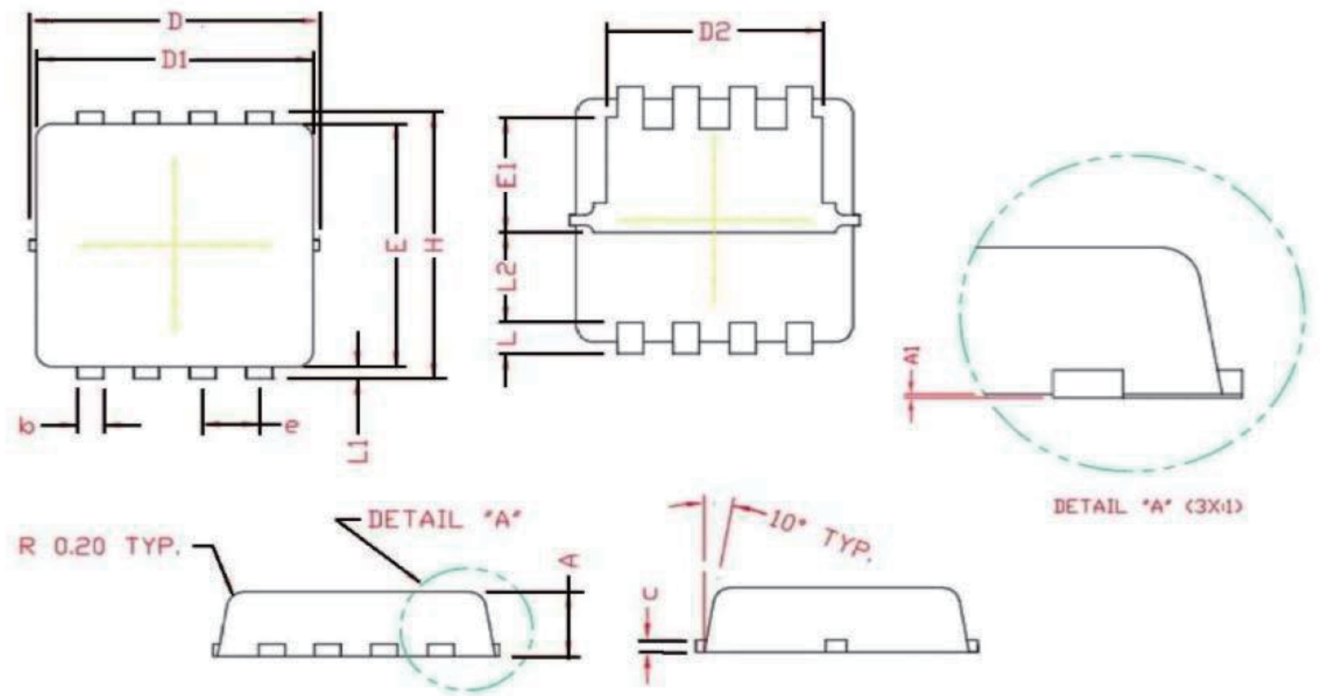



### Figure 11: Unclamped Inductive Switchi

$$EAS=\frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$



## PDFN3*3-8L Package Information




| Symbol | MILLMETER | | |
|---|---|---|---|
| | MIN | MON | MAX |
| A | 0.70 | 0.80 | 0.90 |
| A1 | 0.00 | 0.03 | 0.05 |
| b | 0.24 | 0.30 | 0.35 |
| c | 0.10 | 0.15 | 0.20 |
| D | 3.25 | 3.32 | 3.40 |
| D1 | 3.05 | 3.15 | 3.25 |
| D2 | 2.40 | 2.50 | 2.60 |
| E | 3.00 | 3.10 | 3.20 |
| E1 | 1.35 | 1.45 | 1.55 |
| e | 0.65BSC. | | |
| H | 3.20 | 3.30 | 3.40 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | 0.10 | 0.15 | 0.20 |
| L2 | 1.13REF. | | |