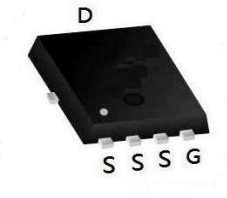
★ Green Device Available
★ Super Low Gate Charge
★ Excellent CdV/dt effect decline
★ Advanced high cell density Trench technology

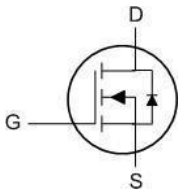
## Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 40V | 11mΩ | 45A |

## PDFN5*6 Pin Configuration




pin assignment




Schematic diagram

## Description

The ZX 50N04 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 ZX 50N04 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

## Package Marking and Ordering

| Product | Package | Marking | Packing | Min Unit Quantity |
|---|---|---|---|---|
| ZX 50N04 | PDFN5*6 | * | 5000PCS/Reel | 5000PCS |

## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 40 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 45 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1] | 25 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | 80 | A |
| EAS | Single Pulse Avalanche Energy[3] | 19 | mJ |
| $I_{AS}$ | Avalanche Current | 30 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 20 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient [1] | --- | 55 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 4.32 | ℃/W |

## N-CH Electrical Characteristics ($T_A$=25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=250μA | 40 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=40V,$V_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250μA | 1 | 1.5 | 2.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=8A | - | 11.0 | 16 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=4A | - | 18.9 | 24 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=5V,$I_D$=8A | 33 | - | - | S |
| **Dynamic Characteristics** (Note4) | | | | | | |
| Input Capacitance | $C_{lss}$ | $V_{DS}$=20V,$V_{GS}$=0V, F=1.0MHz | - | 964 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 109 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 96 | - | PF |
| **Switching Characteristics** (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=20V, $R_L$=2.5Ω $V_{GS}$=10V,$R_{GEN}$=3Ω | - | 5.5 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 14 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 24 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 12 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=20V,$I_D$=8A, $V_{GS}$=10V | - | 22.9 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 3.5 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 5.3 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=9A | - | 0.8 | 1.2 | V |

## N- Channel Typical Electrical and Thermal Characteristics (Curves)

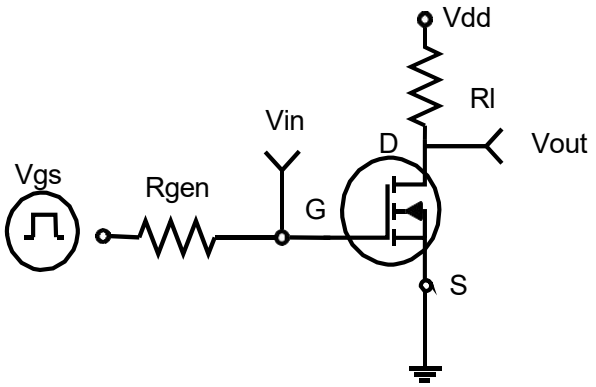



**Figure 1:Switching Test Circuit**

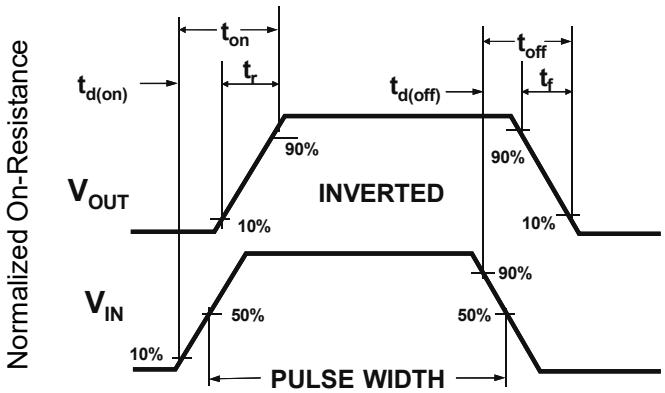



**Figure 2:Switching Waveforms**

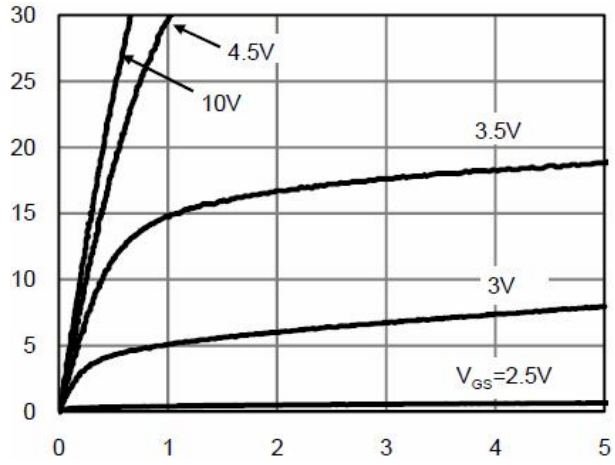



**Figure 3 Output Characteristics**

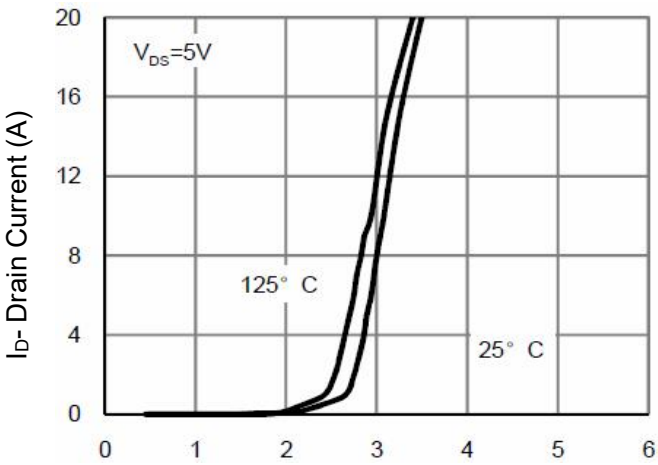



**Figure 4 Transfer Characteristics**

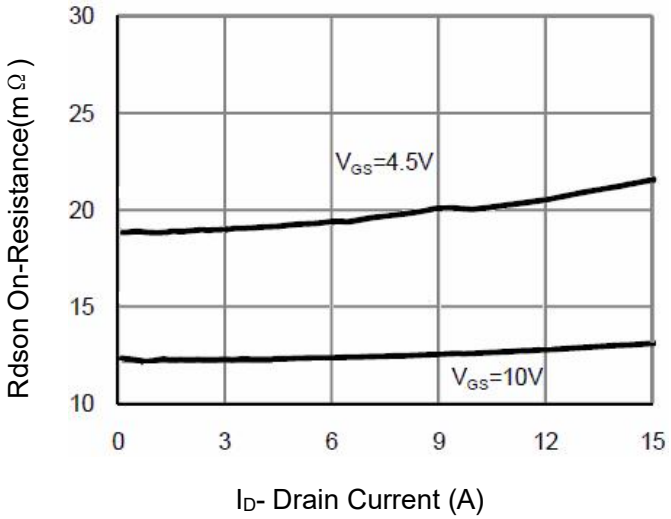



**Figure 5 Drain-Source On-Resistance**

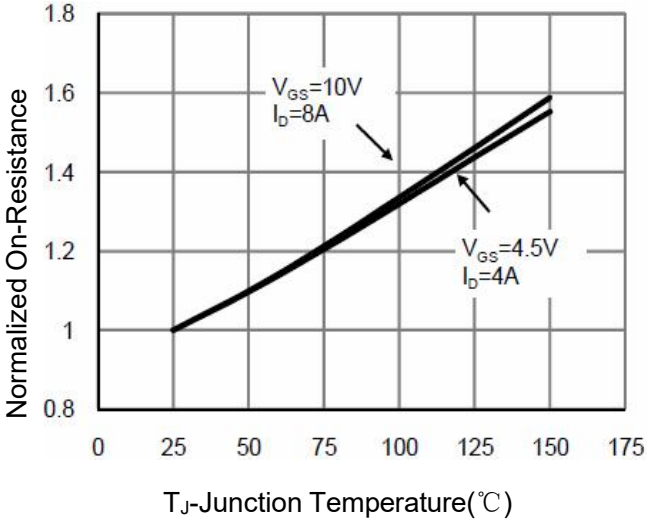
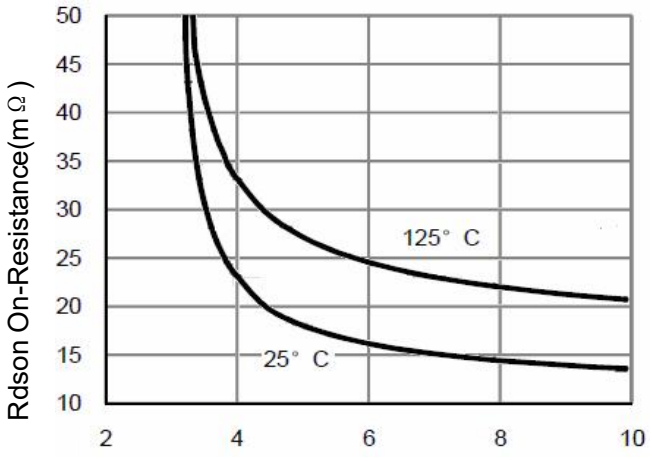
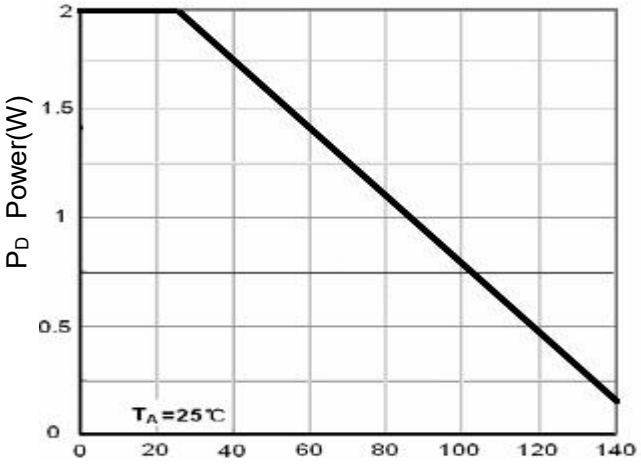



**Figure 6 Drain-Source On-Resistance**



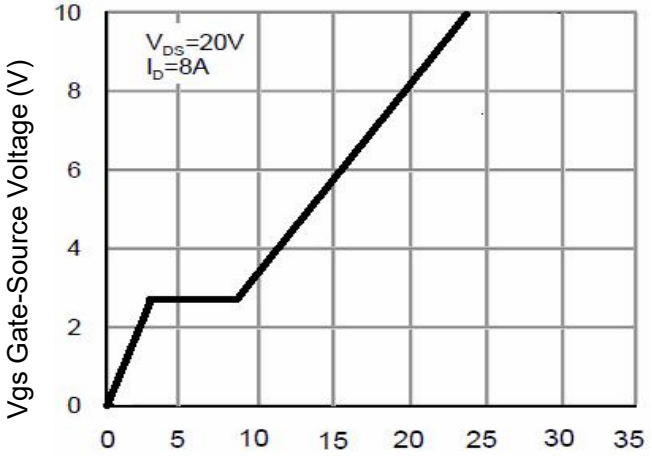

Vgs Gate-Source Voltage (V)

**Figure7 Rdson vs Vgs**



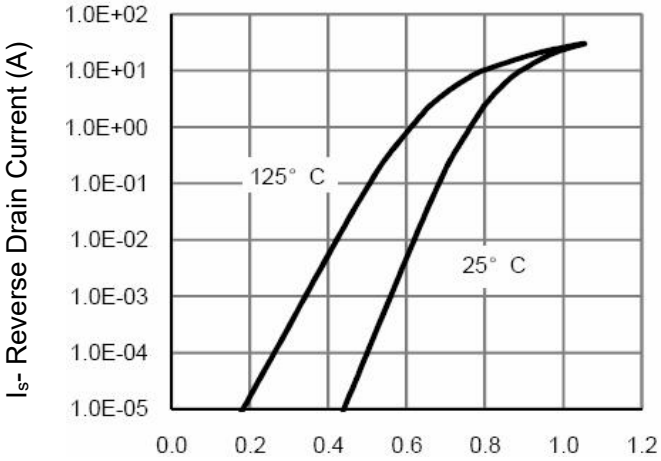

$T_J$-Junction Temperature(℃)

**Figure 8 Power Dissipation**



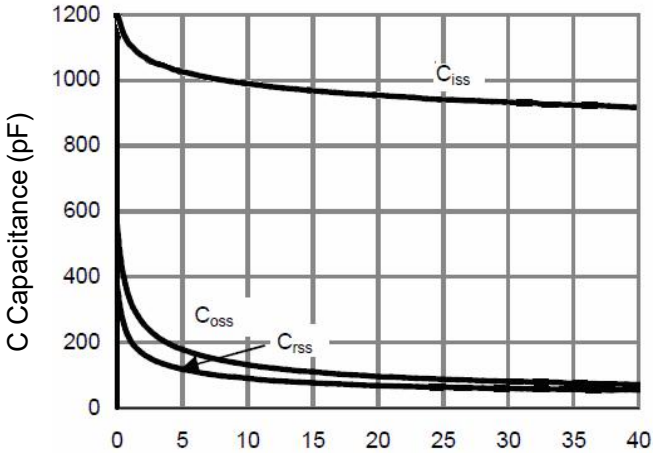

Qg Gate Charge (nC)

**Figure 9 Gate Charge**



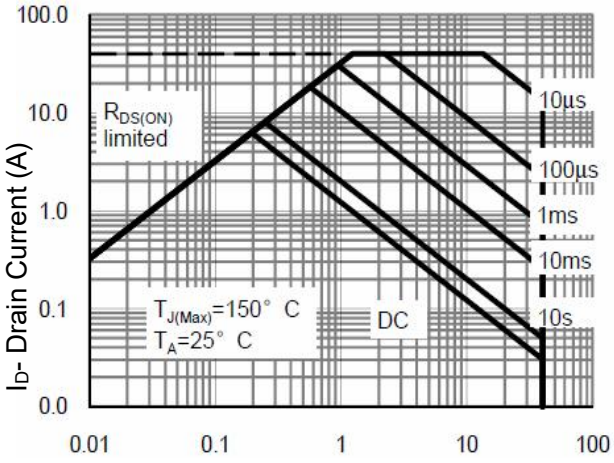

Vds Drain-Source Voltage (V)

**Figure 10 Source- Drain Diode Forward**




Vds Drain-Source Voltage (V)

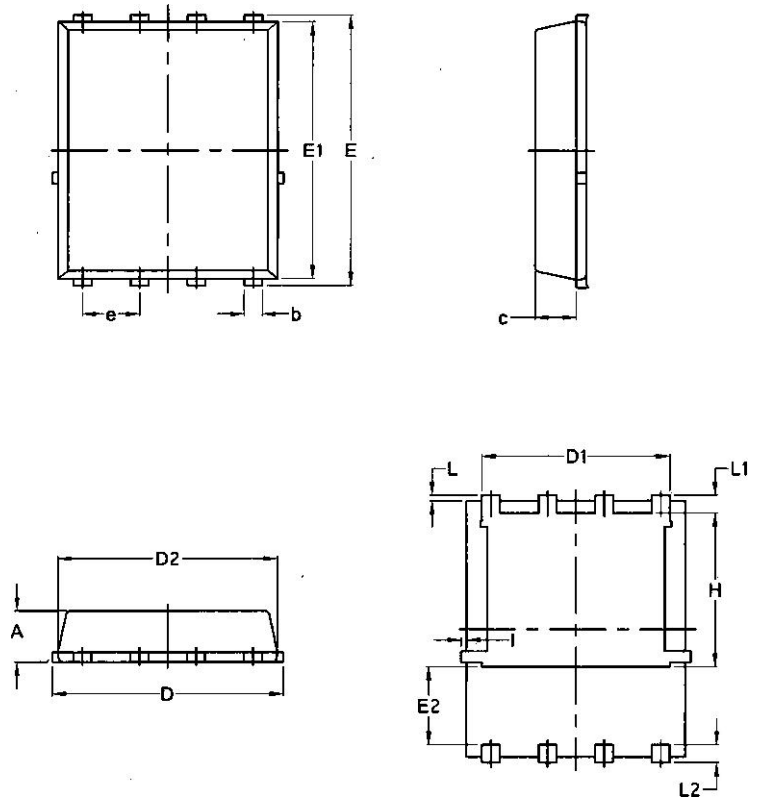
**Figure 11 Capacitance vs Vds**




Vds Drain-Source Voltage (V)

**Figure 12 Safe Operation Area**

## Package Mechanical Data-PDFN5*6-JQ Single




| Symbol | Common | | | |
|---|---|---|---|---|
| | mm | | Inch | |
| | Mim | Max | Min | Max |
| A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| c | 0.824 | 0.0970 | 0.0324 | 0.082 |
| D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| D1 | 4.11 | 4.31 | 0.1618 | 0.1697 |
| D2 | 4.80 | 5.00 | 0.1890 | 0.1969 |
| E | 5.95 | 6.15 | 0.2343 | 0.2421 |
| E1 | 5.65 | 5.85 | 0.2224 | 0.2303 |
| E2 | 1.60 | / | 0.0630 | / |
| e | 1.27 BSC | | 0.05 BSC | |
| L | 0.05 | 0.25 | 0.0020 | 0.0098 |
| L1 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| L2 | 0.38 | 0.50 | 0.0150 | 0.0197 |
| H | 3.30 | 3.50 | 0.1299 | 0.1378 |
| I | / | 0.18 | / | 0.0070 |