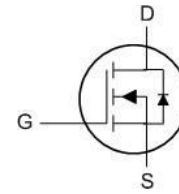




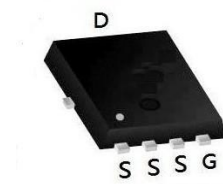
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology



Description

The WLQ50N03F is the high cell density trenched N-ch MOSFETs, which provide excellent R_{DS(on)} and gate charge for most of the synchronous buck converter applications. The WLQ50N03F meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

PDFN5060-8L Pin Configuration



Product Summary

| BVDSS | R _{DS(on)} | I _D |
|-------|---------------------|----------------|
| 30V | 6.5mΩ | 50A |

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, V _{GS} @ 10V ¹ | 50 | A |
| I _{D@T_C=100°C} | Continuous Drain Current, V _{GS} @ 10V ¹ | 30 | A |
| I _{DM} | Pulsed Drain Current ² | 120 | A |
| EAS | Single Pulse Avalanche Energy ³ | 39 | mJ |
| I _{AS} | Avalanche Current | 50 | A |
| P _{D@T_C=25°C} | Total Power Dissipation ⁴ | 20 | 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 ($T_J=25^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|--|--|------|-------|-----------|----------------------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | BVDSS Temperature Coefficient | Reference to 25°C , $I_D=1\text{mA}$ | --- | 0.027 | --- | $V/^\circ\text{C}$ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=12A$ | --- | 6.5 | 8.5 | m Ω |
| | | $V_{GS}=4.5V, I_D=10A$ | --- | 10 | 14 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.0 | --- | 2.5 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -5.8 | --- | $\text{mV}/^\circ\text{C}$ |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$ | --- | --- | 5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$ | --- | 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 | $V_{DD}=12V, V_{GS}=10V, R_G=3.3\Omega, I_D=5A$ | --- | 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 | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$ | --- | 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 | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1.2 | V |

Note :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=34A$
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 Characteristics

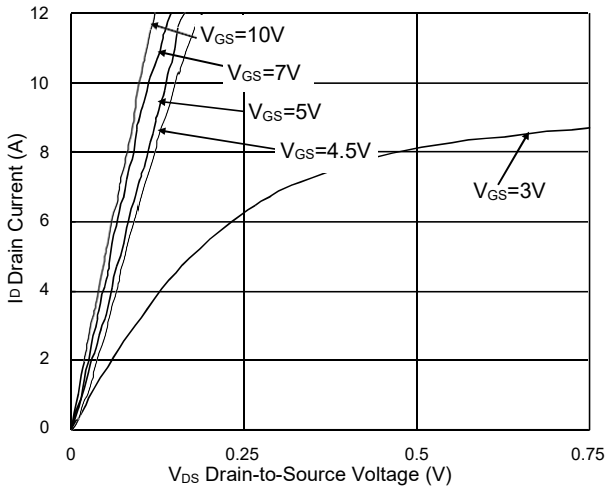


Fig.1 Typical Output Characteristics

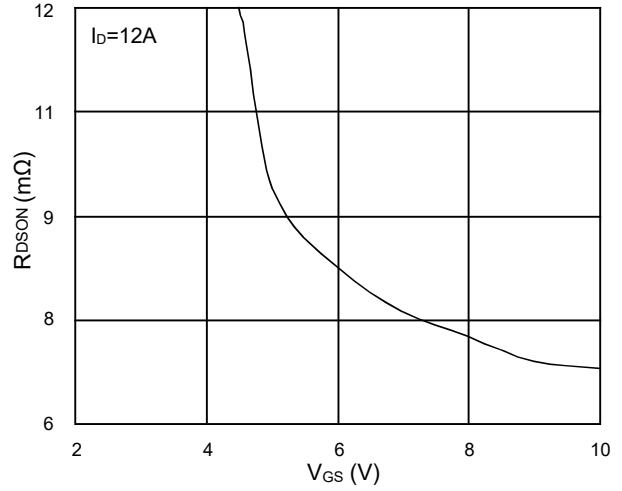


Fig.2 On-Resistance vs. G-S Voltage

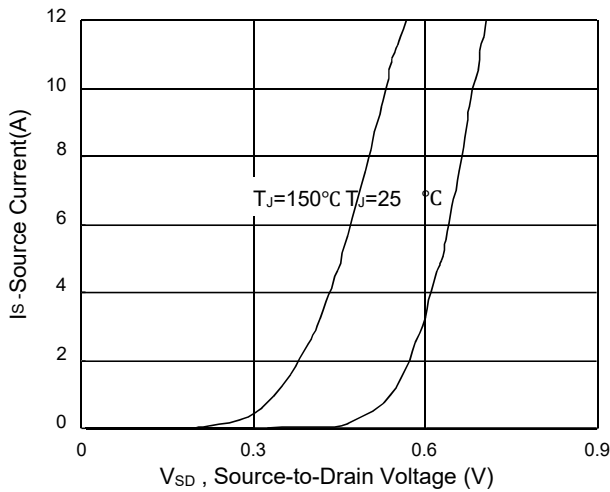


Fig.3 Forward Characteristics of Reverse

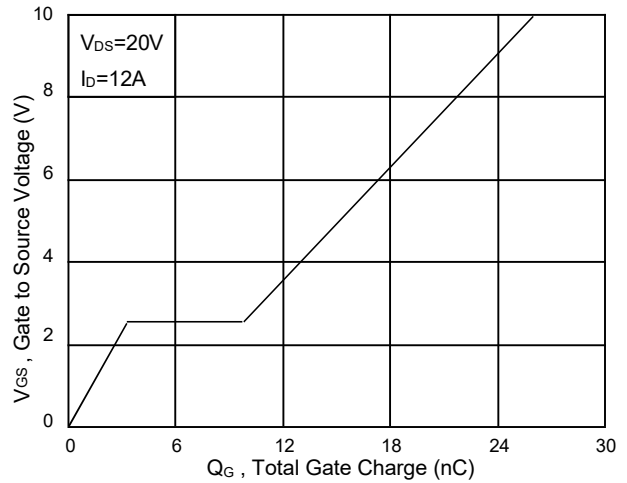


Fig.4 Gate-Charge Characteristics

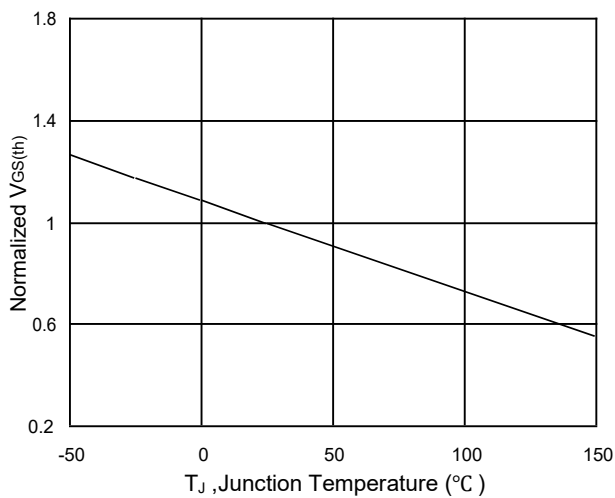


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

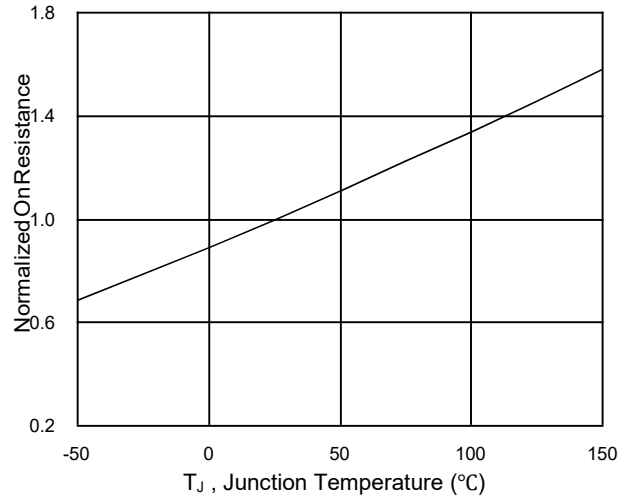


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

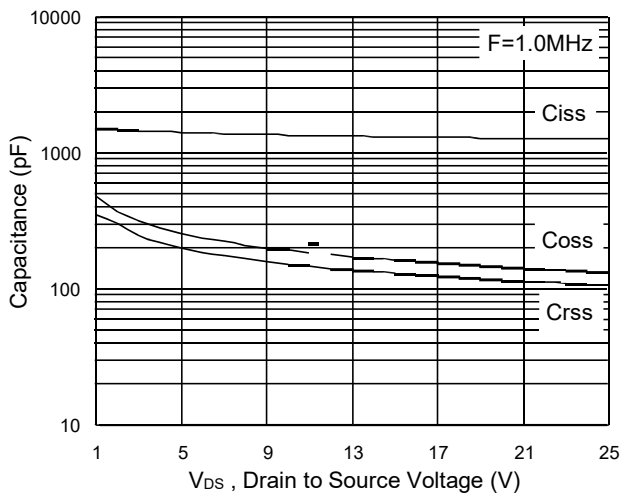


Fig.7 Capacitance

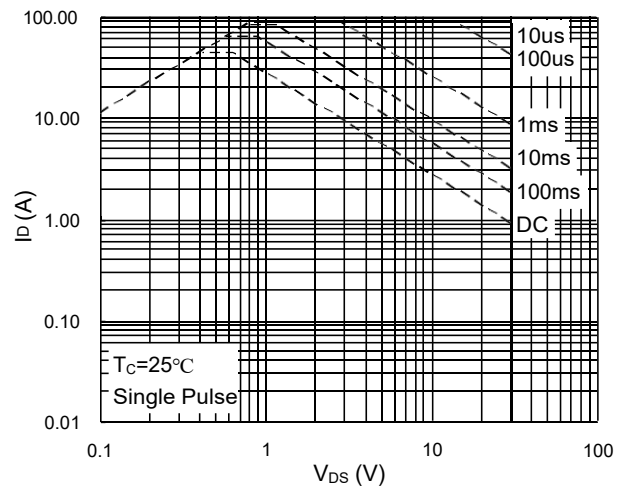


Fig.8 Safe Operating Area

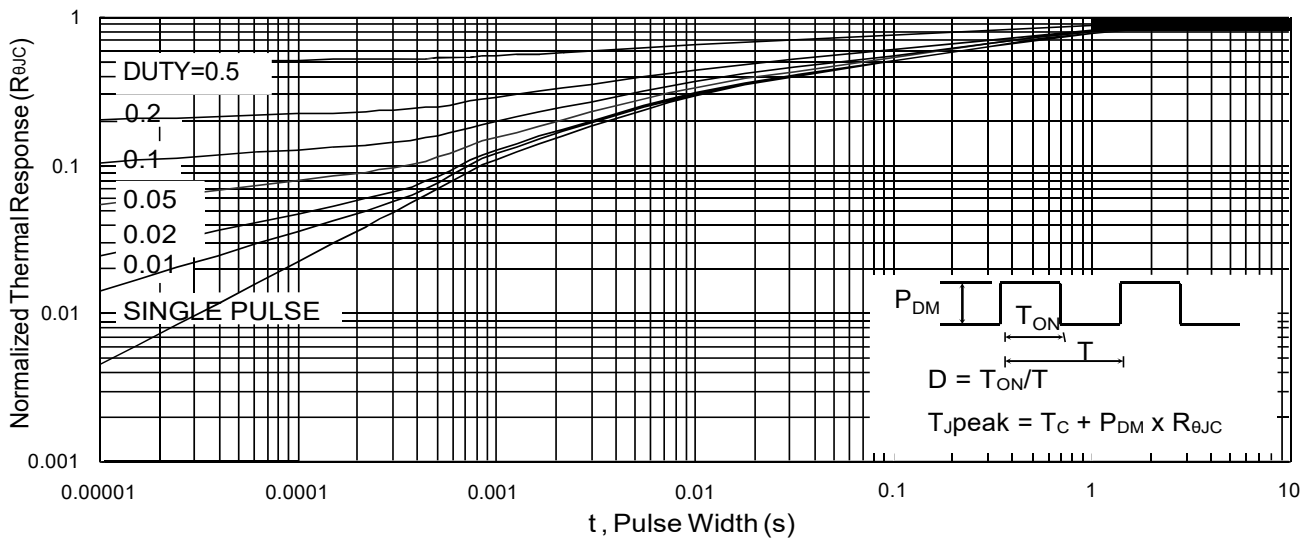


Fig.9 Normalized Maximum Transient Thermal Impedance

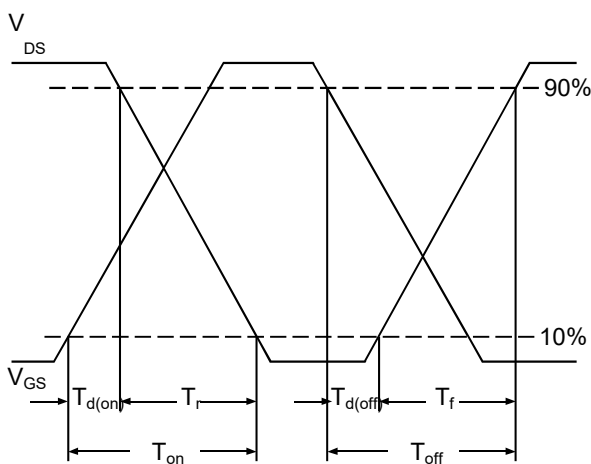


Fig.10 Switching Time Waveform

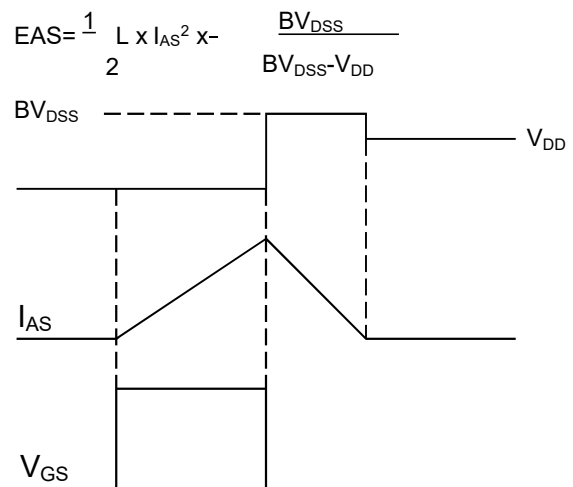
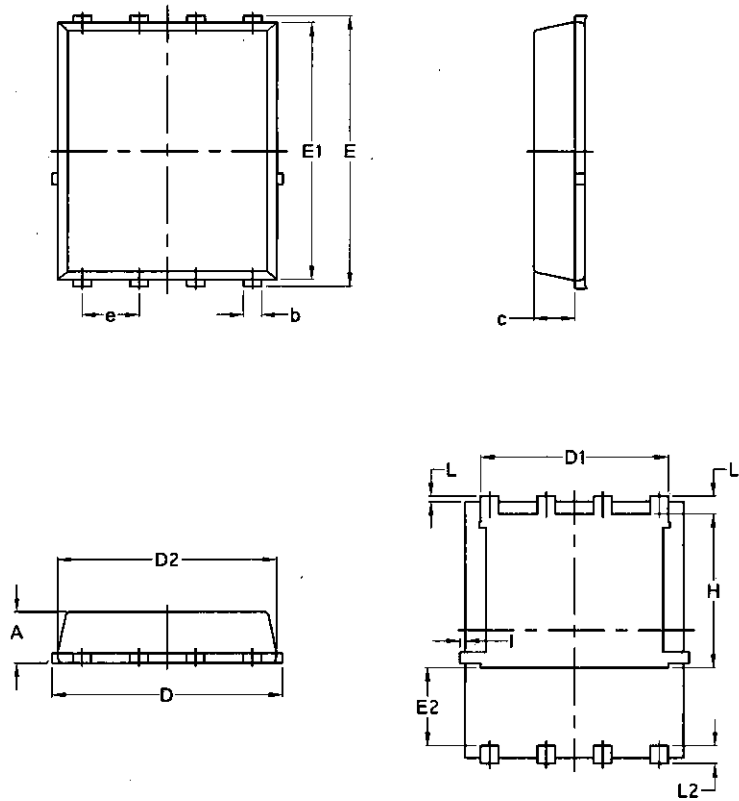


Fig.11 Unclamped Inductive Switching Waveform



Package Mechanical Data-DFN5060-8L- Single



| Symbol | Common | | | |
|--------|----------|--------|----------|--------|
| | mm | | Inch | |
| | Min | 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 |



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