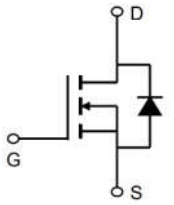
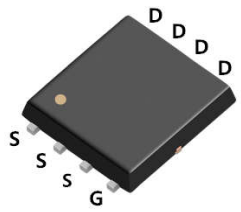
## 40V N-CHANNEL ENHANCEMENT MODE MOSFET

### MAIN CHARACTERISTICS

| | |
|---|---|
| $I_D$ | 60A |
| $V_{DSS}$ | 40V |
| $R_{DSON}$-typ(@$V_{GS}$=10V) | < 13.5mΩ(Type:10.5 mΩ) |




PDFN5*6-8L

Pb lead-free ROHS

### Application

- Battery protection
- Load switch
- Uninterruptible power supply

### Product Specification Classification

| Part Number | Package | Marking | Pack |
|---|---|---|---|
| YFW60N04NF | PDFN5*6-8L | YFW 60N04NF XXXXX | 5000PCS/Tape |

### Maximum Ratings at Tc=25°C unless otherwise specified

| Characteristics | Symbols | Value | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 40 | V |
| Gate - Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current, $V_{GS}$ @ 10V[1] @$T_C$=25℃ | $I_D$ | 60 | A |
| Continuous Drain Current, $V_{GS}$ @ 10V[1] @$T_C$=100℃ | $I_D$ | 28 | A |
| Continuous Drain Current, $V_{GS}$ @ 10V[1] @$T_A$=25℃ | $I_D$ | 10 | A |
| Continuous Drain Current, $V_{GS}$ @ 10V[1] @$T_A$=70℃ | $I_D$ | 8 | A |
| Pulsed Drain Current[2] | $I_{DM}$ | 100 | A |
| Single Pulse Avalanche Energy[3] | $E_{AS}$ | 20 | mJ |
| Avalanche Current | $I_{AS}$ | 20 | A |
| Total Power Dissipation[4] @$T_C$=25℃ | $P_D$ | 46 | W |
| Storage Temperature Range | $T_{STG}$ | -55 to +150 | °C |
| Operating Junction Temperature Range | $T_J$ | -55 to +150 | °C |
| Thermal Resistance Junction-ambient (Steady State)[1] | $R_{\theta JA}$ | 62 | °C/W |
| Thermal Resistance Junction-Case[1] | $R_{\theta JC}$ | 2.7 | °C/W |



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## Maximum Ratings at Tc=25°C unless otherwise specified

| Characteristics | Test Condition | Symbols | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250uA | $BV_{DSS}$ | 40 | 45 | - | V |
| BVDSS Temperature Coefficient | Reference to 25℃ , $I_D$=1mA | $\Delta BV_{DSS/\Delta TJ}$ | - | 0.034 | - | V/°C |
| Static Drain-Source On-Resistance[2] | $V_{GS}$=10V, $I_D$=20A | $R_{DS(ON)}$ | - | 10.5 | 13.5 | mΩ |
| | $V_{GS}$=4.5V, $I_D$=10A | | - | 13.5 | 16.5 | |
| Gate -Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_D$=250uA | $V_{GS(th)}$ | 1.0 | 1.6 | 2.5 | V |
| $V_{GS}$(th) Temperature Coefficient | | $\Delta V_{GS(th)}$ | - | -5.64 | - | mV/°C |
| Drain -Source Leakage Current | $V_{DS}$=32V , $V_{GS}$=0V , $T_J$=25℃ | $I_{DSS}$ | - | - | 1 | μA |
| | $V_{DS}$=32V , $V_{GS}$=0V , $T_J$=55℃ | | - | - | 5 | |
| Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | $I_{GSS}$ | - | - | ±100 | nA |
| Forward Transconductance | $V_{DS}$=5V, $I_D$=20A | $g_{FS}$ | - | 36 | - | S |
| Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | $R_g$ | - | 2.1 | - | Ω |
| Total Gate Charge(4.5V) | $V_{DS}$=20V<br>$V_{GS}$=4.5V<br>$I_D$=12A | $Q_g$ | - | 10.7 | - | nC |
| Gate-Source Charge | | $Q_{gs}$ | - | 3.3 | - | |
| Gate-Drain Charge | | $Q_{gd}$ | - | 4.2 | - | |
| Turn-on delay time | $V_{DD}$=12V<br>$V_{GS}$=10V<br>$R_G$=3.3Ω<br>$I_D$=6A | $t_{d(on)}$ | - | 8.6 | - | ns |
| Rise Time | | $T_r$ | - | 3.4 | - | |
| Turn-Off Delay Time | | $t_{d(OFF)}$ | - | 25 | - | |
| Fall Time | | $t_f$ | - | 2.2 | - | |
| Input Capacitance | $V_{DS}$=15V<br>$V_{GS}$=0V<br>f=1.0MHz | $C_{iss}$ | - | 1314 | - | pF |
| Output Capacitance | | $C_{oss}$ | - | 120 | - | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 88 | - | |
| Continuous Source Current[1,5] | $V_G$=$V_D$=0V , Force Current | $I_S$ | - | - | 46 | A |
| Pulsed Source Current[2,5] | | $I_{SM}$ | - | - | 100 | A |
| Diode Forward Voltage [2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | $V_{SD}$ | - | - | 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 VDD=25V,VGS=10V,L=0.1mH,IAS=20A
4、The power dissipation is limited by 150℃ junction temperature
5 、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.


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## Ratings and Characteristic Curves

### Typical Characteristics

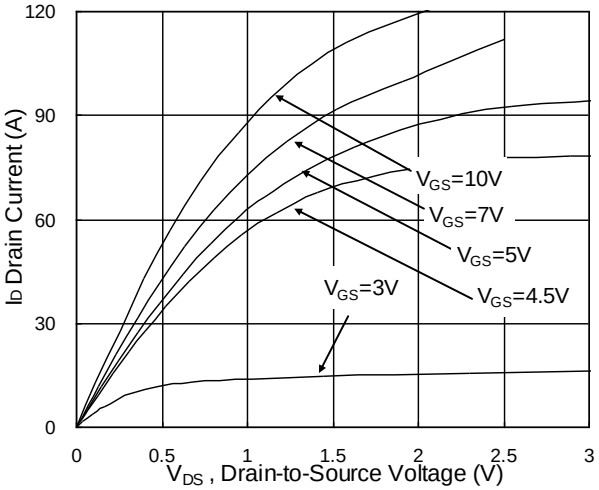



Fig.1 Typical Output Characteristics

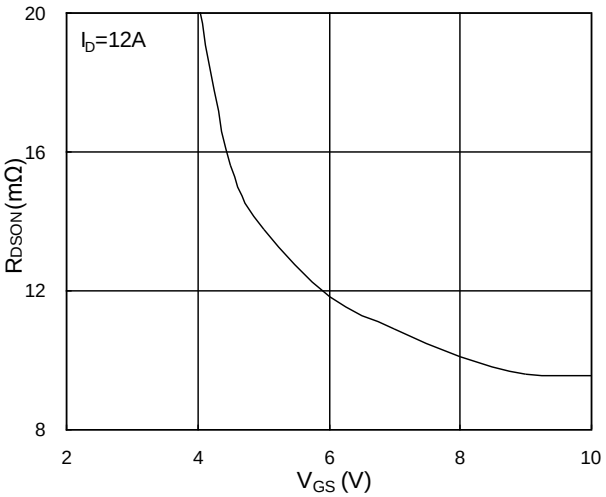



Fig.2 On-Resistance vs. G-S Voltage

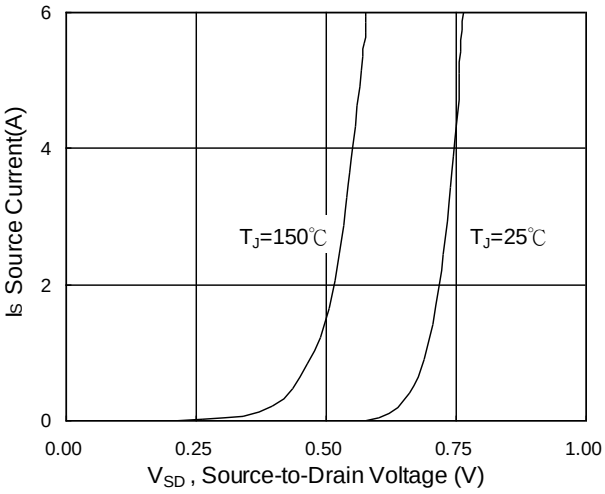



Fig.3 Forward Characteristics of Reverse

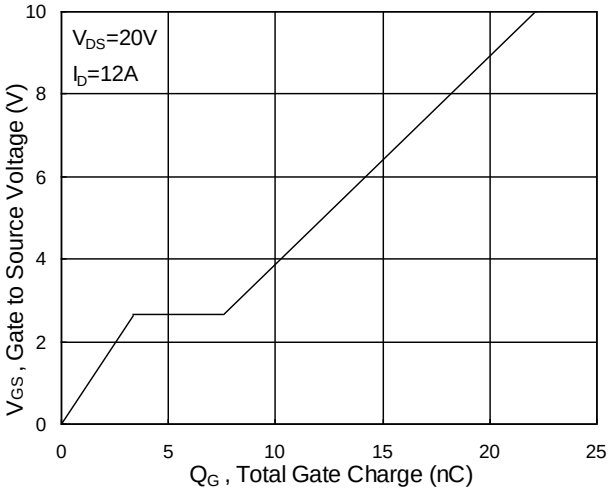



Fig.4 Gate-Charge Characteristics

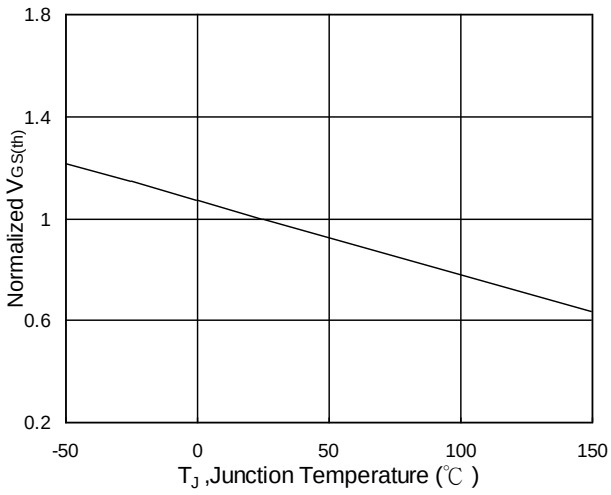



Fig.5 $V_{GS(th)}$ vs. $T_J$

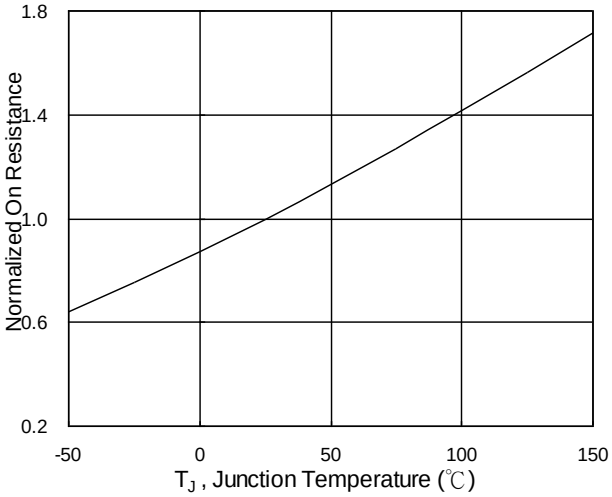



Fig.6 Normalized $R_{DSON}$ vs. $T_J$


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## Ratings and Characteristic Curves

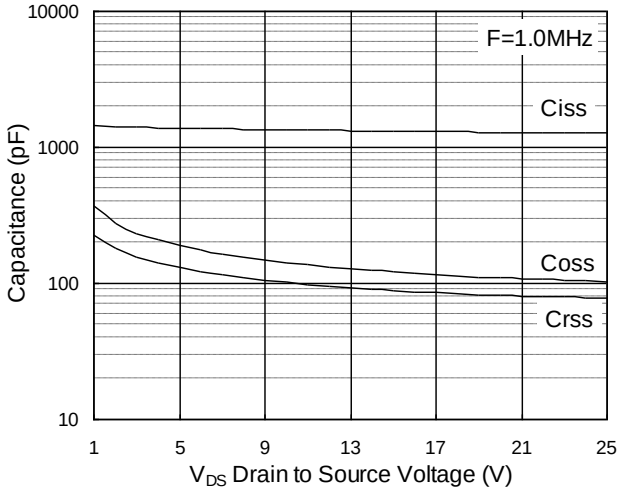



Fig.7 Capacitance

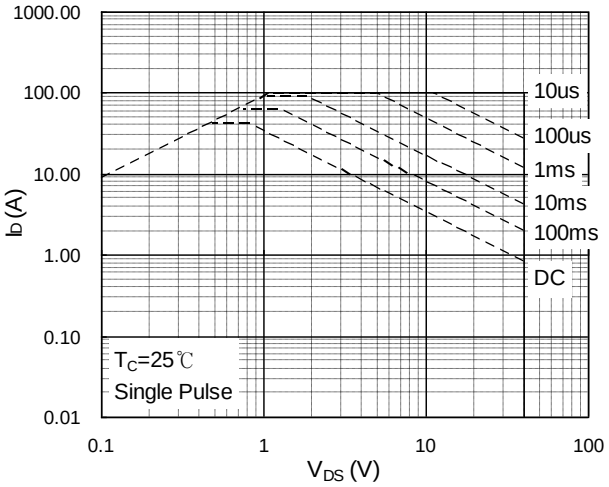



Fig.8 Safe Operating Area

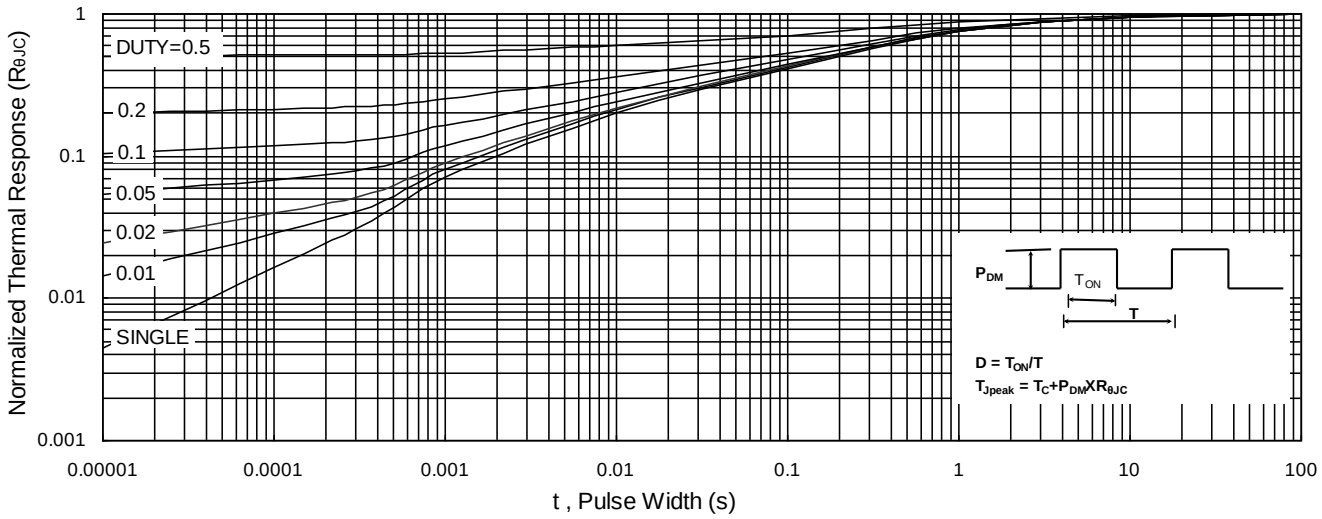



Fig.9 Normalized Maximum Transient Thermal Impedance

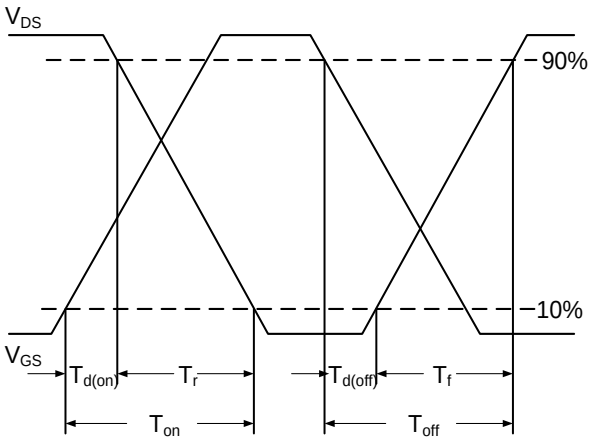



Fig.10 Switching Time Waveform

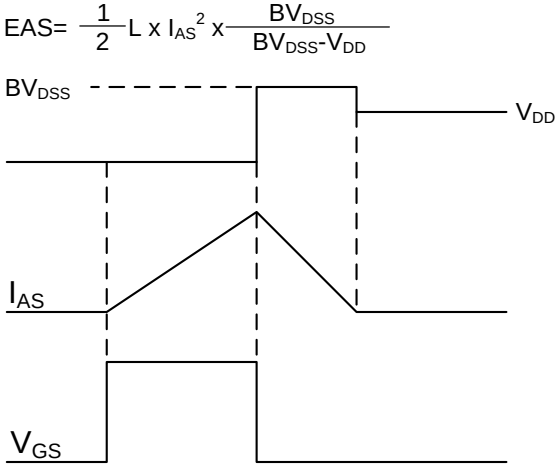
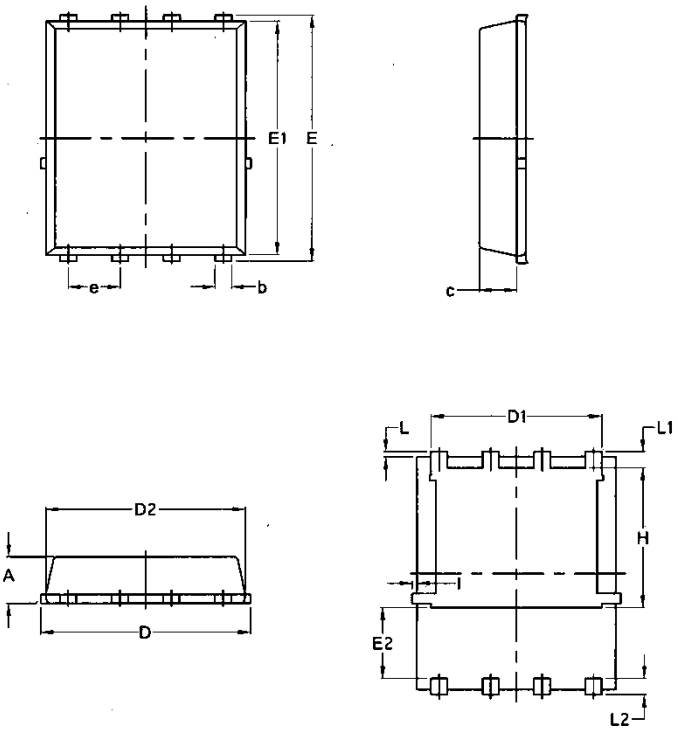



Fig.11 Unclamped Inductive Switching Waveform


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## Package Outline Dimensions Millimeters

# PDFN5*6-8L




| 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 |



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