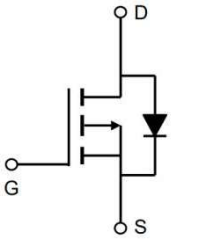
## -40V P-CHANNEL ENHANCEMENT MODE MOSFET

### MAIN CHARACTERISTICS

| | |
|---|---|
| $I_D$ | -15A |
| $V_{DSS}$ | -40V |
| $R_{DSON}$-typ(@$V_{GS}$=-10V) | < 32mΩ(Type:27 mΩ) |





TO-252

### Application

- Battery protection
- Load switch
- Uninterruptible power supply

### Product Specification Classification

| Part Number | Package | Marking | Pack |
|---|---|---|---|
| YFW15P04AD | TO-252 | YFW 15P04AD XXXXX | 2500PCS/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℃ | $I_D$ | -15 | A |
| Continuous Drain Current, $V_{GS}$ @ -10V[1] @$T_C$=100℃ | $I_D$ | -11 | A |
| Pulsed Drain Current [2] | $I_{DM}$ | -54 | A |
| Single Pulse Avalanche Energy[3] | $E_{AS}$ | 40.9 | mJ |
| Avalanche Current | $I_{AS}$ | -28.6 | A |
| Total Power Dissipation[4] @$T_C$=25℃ | $P_D$ | 35 | W |
| Storage Temperature Range | $T_{STG}$ | -55 to +150 | °C |
| Operating Junction Temperature Range | $T_J$ | -55 to +150 | °C |
| Thermal Resistance Junction-Ambient [1] | $R_{\theta JA}$ | 62 | °C/W |
| Thermal Resistance Junction to Case[1] | $R_{\theta JC}$ | 3.8 | °C/W |

## 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 | -47 | - | V |
| $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=-1mA | $\Delta BV_{DSS/\Delta TJ}$ | - | -0.02 | - | V/°C |
| Static Drain-Source On-Resistance [2] | $V_{GS}$=-10V, $I_D$=-8A | $R_{DS(ON)}$ | - | 27 | 32 | mΩ |
| | $V_{GS}$=-4.5V, $I_D$=-4A | | - | 39 | 46 | |
| 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 | | $\Delta V_{GS(th)}$ | - | 3.72 | - | 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 , $I_D$=-8A | $g_{fs}$ | - | 10.7 | - | S |
| Total Gate Charge(-4.5V) | $V_{DS}$=-15V<br>$V_{GS}$=-4.5V<br>$I_D$=-1A | $Q_g$ | - | 11.5 | - | nC |
| Gate-Source Charge | | $Q_{gs}$ | - | 3.5 | - | |
| Gate-Drain Charge | | $Q_{gd}$ | - | 3.3 | - | |
| Turn-on delay time | $V_{DD}$ =-15V<br>$V_{GS}$=-10V<br>$I_D$= -1A<br>$R_G$=3.3Ω | $t_{d(on)}$ | - | 22 | - | ns |
| Rise Time | | $T_r$ | - | 15.7 | - | |
| Turn-Off Delay Time | | $t_{d(OFF)}$ | - | 59 | - | |
| Fall Time | | $t_f$ | - | 5.5 | - | |
| Input Capacitance | $V_{DS}$=-15V<br>$V_{GS}$=0V<br>f=1MHz | $C_{iss}$ | - | 415 | - | pF |
| Output Capacitance | | $C_{oss}$ | - | 134 | - | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | 102 | - | |
| Continuous Source Current[1,5] | $V_G$=$V_D$=0V , Force Current | $I_S$ | - | - | -27 | A |
| Pulsed Source Current[2,5] | | $I_{SM}$ | - | - | -54 | 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 inch 2 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 =-28.6A
4、The power dissipation is limited by 150℃ 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

## Ratings and Characteristic Curves

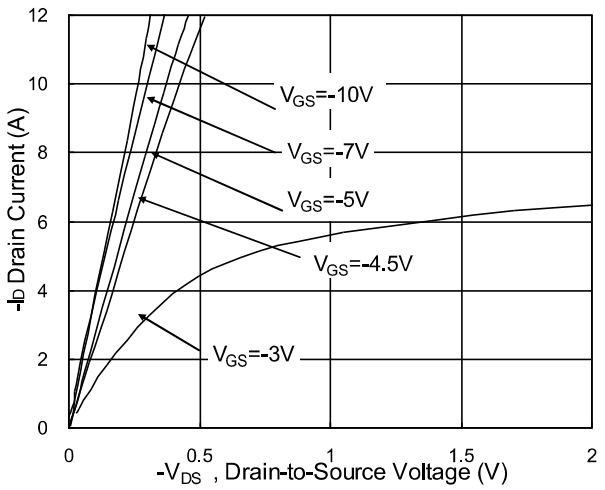



**Fig.1 Typical Output Characteristics**

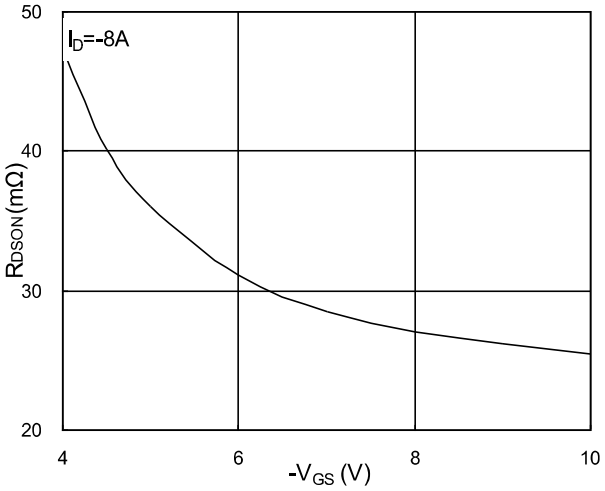



**Fig.2 On-Resistance v.s Gate-Source**

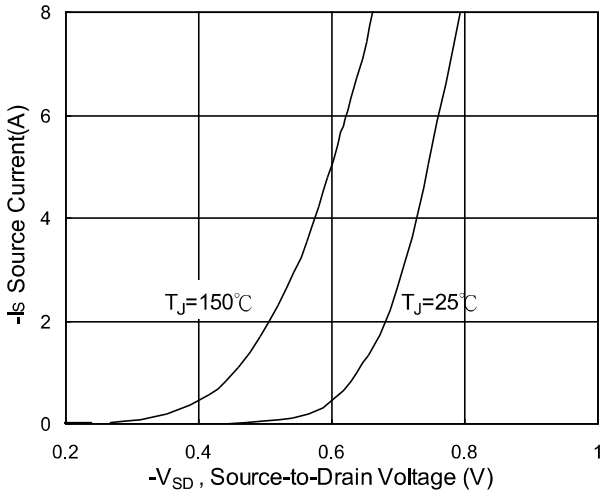



**Fig.3 Forward Characteristics Of Reverse**

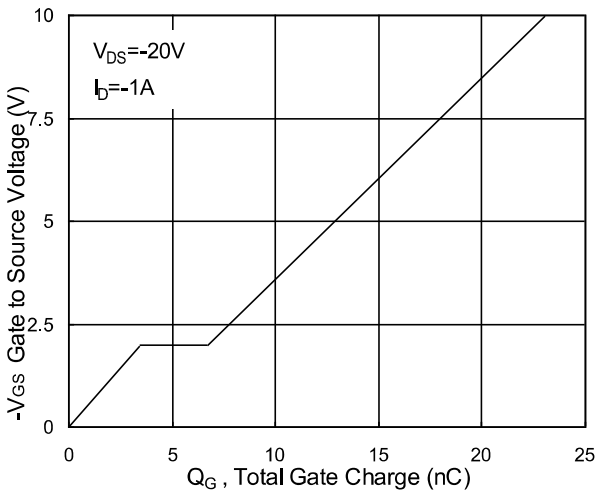



**Fig.4 Gate Charge Characteristics**

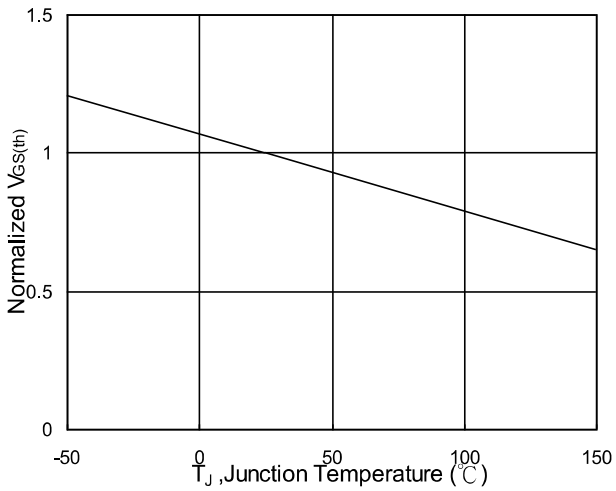



**Fig.5 Normalized $V_{GS(th)}$ v.s $T_J$**

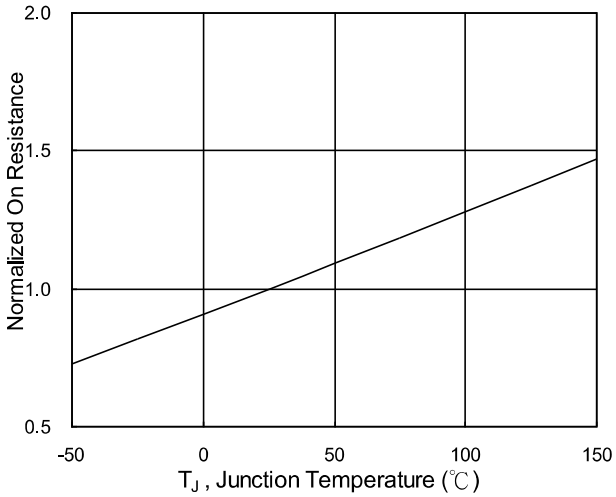



**Fig.6 Normalized $R_{DSON}$ v.s $T_J$**

## Ratings and Characteristic Curves

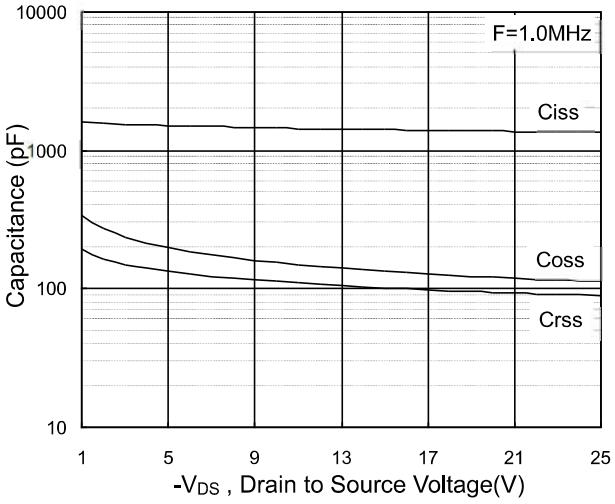



Fig.7 Capacitance

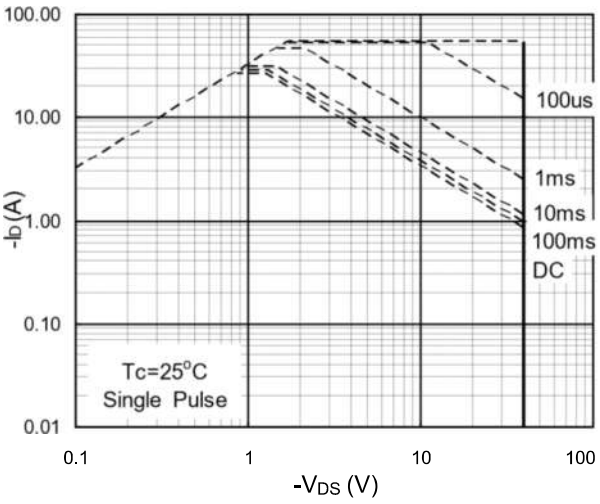



Fig.8 Safe Operating Area

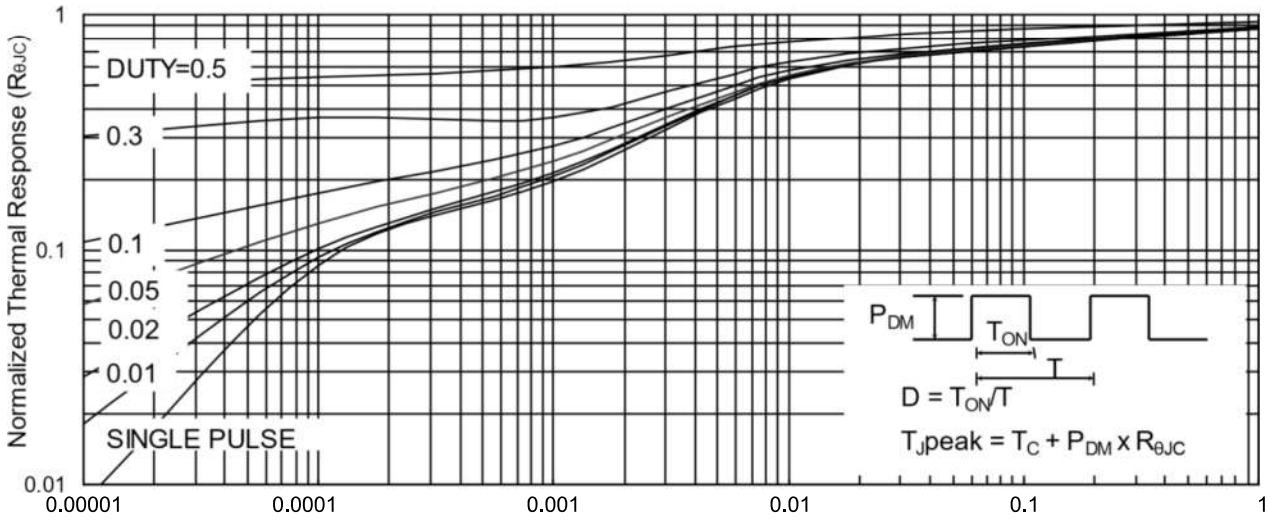



Fig.9 Normalized Maximum Transient Thermal Impedance

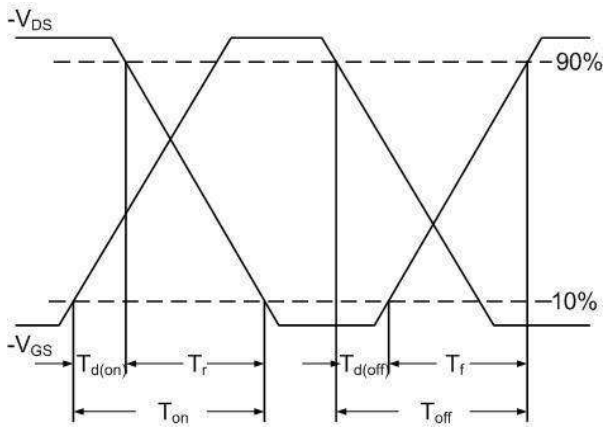



Fig.10 Switching Time Waveform

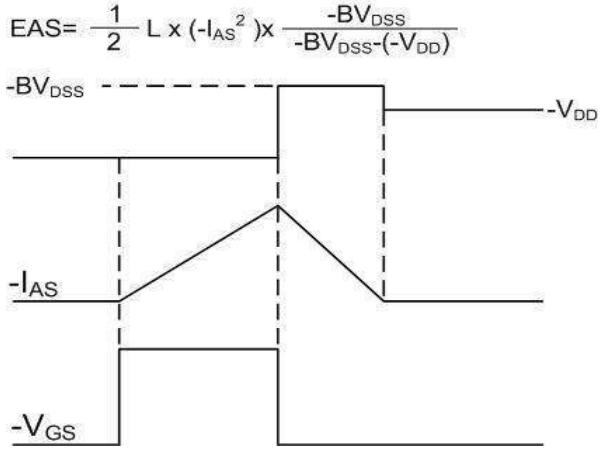
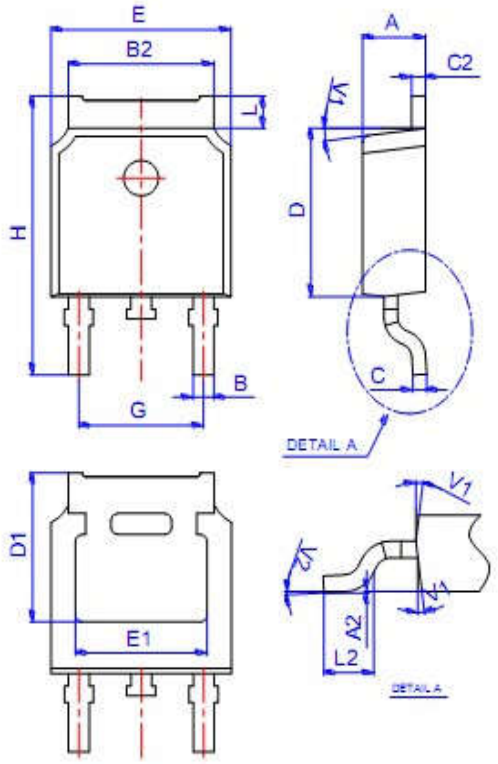



Fig.11 Unclamped Inductive Waveform

## Package Outline Dimensions Millimeters

**TO-252**




| Dim. | Min. | Typ. | Max. |
|---|---|---|---|
| A | 2.10 | - | 2.50 |
| A2 | 0 | - | 0.10 |
| B | 0.66 | - | 0.86 |
| B2 | 5.18 | - | 5.48 |
| C | 0.40 | - | 0.60 |
| C2 | 0.44 | - | 0.58 |
| D | 5.90 | - | 6.30 |
| D1 | 5.30REF | | |
| E | 6.40 | - | 6.80 |
| E1 | 4.63 | - | - |
| G | 4.47 | - | 4.67 |
| H | 9.50 | - | 10.70 |
| L | 1.09 | - | 1.21 |
| L2 | 1.35 | - | 1.65 |
| V1 | - | 7° | - |
| V2 | 0° | - | 6° |

All Dimensions in millimeter