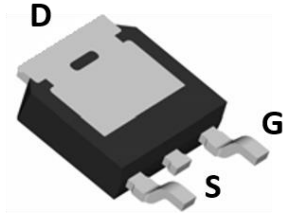
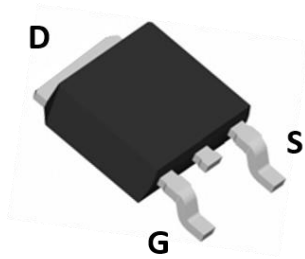
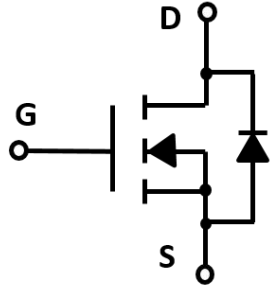


## N-Channel Enhancement Mode Field Effect Transistor



**TO-252**



### Product Summary

- $V_{DS}$  40V
- $I_D$  60A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $<7.0$  mohm
- $R_{DS(ON)}$  (at  $V_{GS}=4.5V$ )  $<9.5$  mohm
- 100% UIS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Trench Power LV MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$

### Applications

- High current load applications
- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

### ■ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter                                        |                         | Symbol          | Limit           | Unit                      |
|--------------------------------------------------|-------------------------|-----------------|-----------------|---------------------------|
| Drain-source Voltage                             |                         | $V_{DS}$        | 40              | V                         |
| Gate-source Voltage                              |                         | $V_{GS}$        | $\pm 20$        | V                         |
| Drain Current                                    | $T_C=25^\circ\text{C}$  | $I_D$           | 60              | A                         |
|                                                  | $T_C=100^\circ\text{C}$ |                 | 42              |                           |
| Pulsed Drain Current <sup>A</sup>                |                         | $I_{DM}$        | 200             | A                         |
| Total Power Dissipation                          | $T_C=25^\circ\text{C}$  | $P_D$           | 54              | W                         |
|                                                  | $T_C=100^\circ\text{C}$ |                 | 27              | W                         |
| Single Pulse Avalanche Energy <sup>B</sup>       |                         | $E_{AS}$        | 120             | mJ                        |
| Thermal Resistance Junction-to-Case <sup>C</sup> |                         | $R_{\theta JC}$ | 2.8             | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range           |                         | $T_J, T_{STG}$  | $-55 \sim +175$ | $^\circ\text{C}$          |

### ■ Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking   | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-----------|----------------------|-------------------------|----------------------------|---------------|
| YJD60N04A     | F2           | YJD60N04A | 2500                 | 2500                    | 25000                      | 13" reel      |



# YJD60N04A

## ■ Electrical Characteristics (T<sub>J</sub>=25℃ unless otherwise noted)

| Parameter                             | Symbol              | Conditions                                                                                               |                     | Min | Typ  | Max  | Units |
|---------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------|---------------------|-----|------|------|-------|
| Static Parameter                      |                     |                                                                                                          |                     |     |      |      |       |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                                              |                     | 40  |      |      | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =40V,V <sub>GS</sub> =0V                                                                 | T <sub>J</sub> =25℃ |     |      | 1    | μA    |
|                                       |                     |                                                                                                          | T <sub>J</sub> =55℃ |     |      | 5    |       |
| Gate-Body Leakage Current             | I <sub>GSS</sub>    | V <sub>GS</sub> = ±20V, V <sub>DS</sub> =0V                                                              |                     |     |      | ±100 | nA    |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                                |                     | 1.0 | 1.5  | 2.5  | V     |
| Static Drain-Source On-Resistance     | R <sub>DS(ON)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> =20A                                                               |                     |     | 5.4  | 7    | mΩ    |
|                                       |                     | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =10A                                                              |                     |     | 6.8  | 9.5  |       |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =20A,V <sub>GS</sub> =0V                                                                  |                     |     | 0.8  | 1.2  | V     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |                                                                                                          |                     |     |      | 60   | A     |
| Dynamic Parameters                    |                     |                                                                                                          |                     |     |      |      |       |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =20V,V <sub>GS</sub> =0V,f=1MHZ                                                          |                     |     | 1450 |      | pF    |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                                          |                     |     | 223  |      |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |                                                                                                          |                     |     | 153  |      |       |
| Switching Parameters                  |                     |                                                                                                          |                     |     |      |      |       |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =10V,V <sub>DS</sub> =20V,I <sub>D</sub> =20A                                            |                     |     | 29   |      | nC    |
| Gate-Source Charge                    | Q <sub>gs</sub>     |                                                                                                          |                     |     | 6    |      |       |
| Gate-Drain Charge                     | Q <sub>gd</sub>     |                                                                                                          |                     |     | 7    |      |       |
| Reverse Recovery Charge               | Q <sub>rr</sub>     | I <sub>F</sub> =20A, di/dt=100A/us                                                                       |                     |     | 21   |      | ns    |
| Reverse Recovery Time                 | t <sub>rr</sub>     |                                                                                                          |                     |     | 40   |      |       |
| Turn-on Delay Time                    | t <sub>D(on)</sub>  | V <sub>GS</sub> =10V,V <sub>DD</sub> =20V, I <sub>D</sub> =2A,R <sub>L</sub> =1Ω<br>R <sub>GEN</sub> =3Ω |                     |     | 6    |      |       |
| Turn-on Rise Time                     | t <sub>r</sub>      |                                                                                                          |                     |     | 36   |      |       |
| Turn-off Delay Time                   | t <sub>D(off)</sub> |                                                                                                          |                     |     | 29   |      |       |
| Turn-off fall Time                    | t <sub>f</sub>      |                                                                                                          |                     |     | 7    |      |       |

A. Pulse Test: Pulse Width≤300us, Duty cycle ≤2%.

B. T<sub>J</sub>=25℃, V<sub>DD</sub>=20V, V<sub>G</sub>=10V, L=0.5mH, R<sub>g</sub>=25 Ω

C. R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design, while R<sub>θJA</sub> is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.



## ■ Typical Performance Characteristics

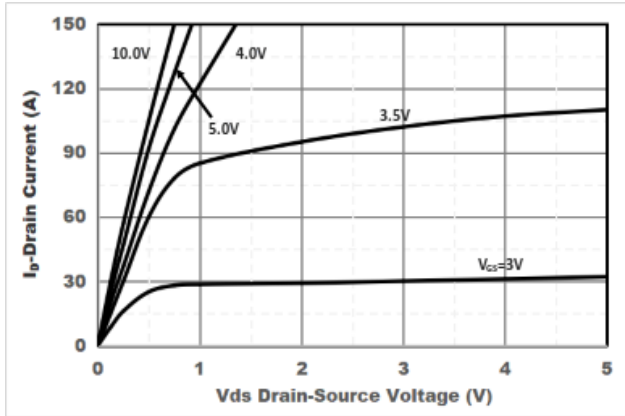


Figure1. Output Characteristics

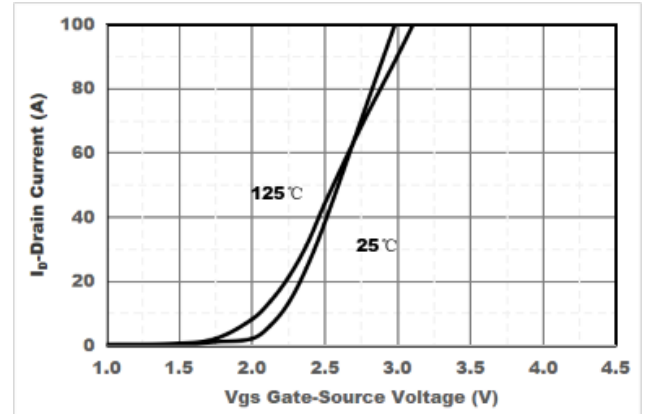


Figure2. Transfer Characteristics

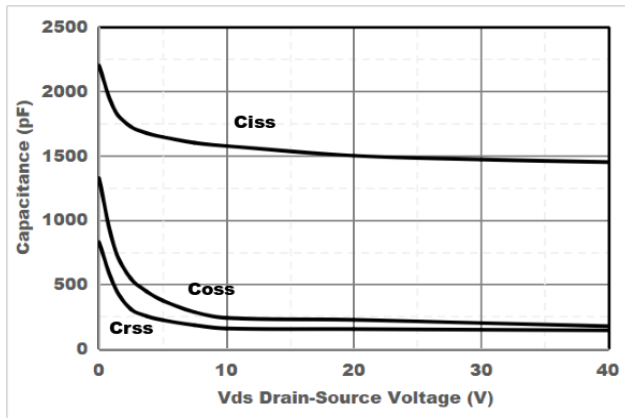


Figure3. Capacitance Characteristics

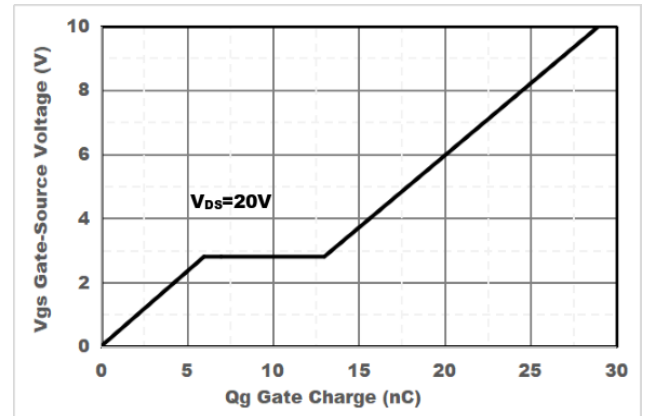


Figure4. Gate Charge

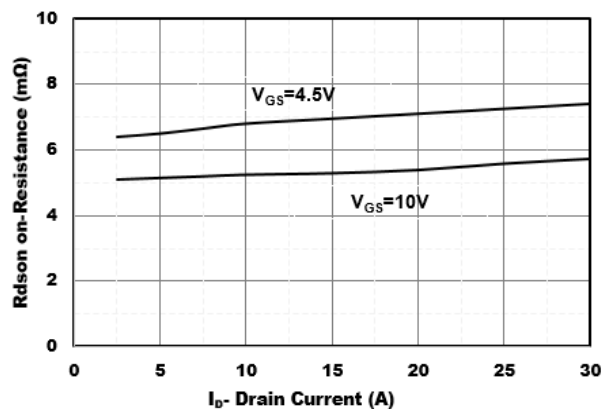


Figure5. Drain-Source on Resistance

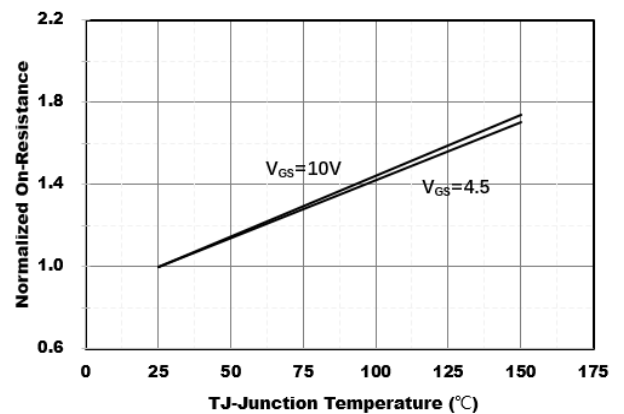


Figure6. Drain-Source on Resistance

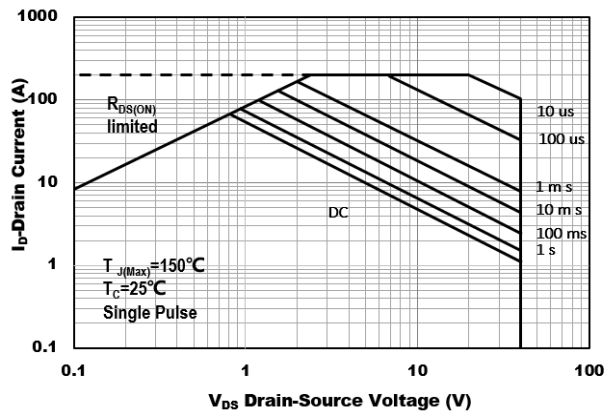


Figure7. Safe Operation Area

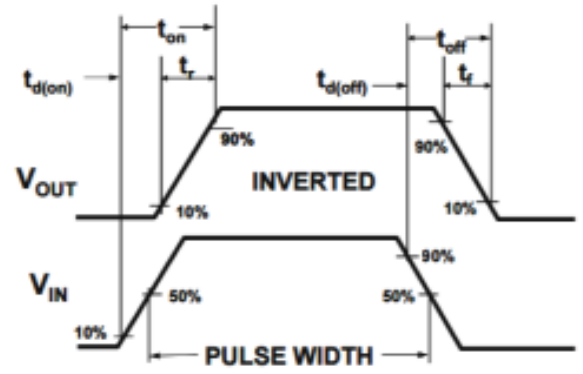
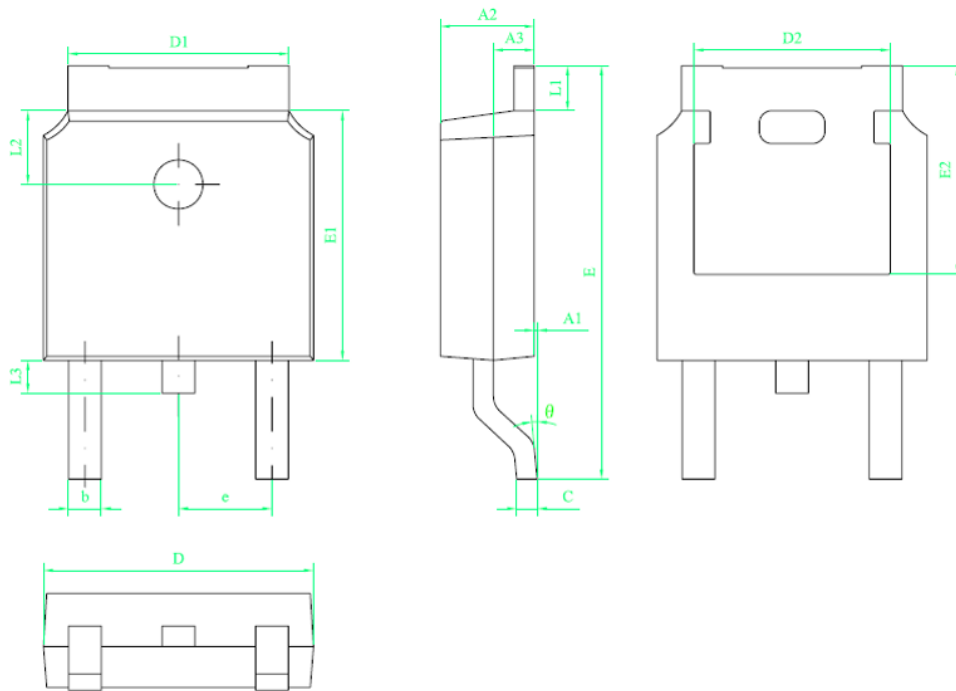


Figure8. Switching wave



## YJD60N04A

### ■ TO-252 Package information



| 符 号 | 尺 寸  |       |       |
|-----|------|-------|-------|
|     | min  | nom   | max   |
| A1  | 0    | ----  | 0.10  |
| A2  | 2.20 | 2.30  | 2.40  |
| A3  | 0.90 | 1.00  | 1.10  |
| b   | 0.75 | ----  | 0.85  |
| c   | 0.50 | ----  | 0.60  |
| D   | 6.50 | 6.60  | 6.70  |
| D1  | 5.30 | 5.40  | 5.50  |
| D2  | 4.70 | 4.80  | 4.90  |
| E   | 9.90 | 10.10 | 10.30 |
| E1  | 6.00 | 6.10  | 6.20  |
| E2  | 5.20 | 5.30  | 5.40  |
| e   | 2.20 | 2.286 | 2.40  |
| L1  | 0.90 | ----  | 1.25  |
| L2  | 1.70 | 1.80  | 1.90  |
| L3  | 0.60 | 0.80  | 1.00  |
| θ   | 0°   | ----  | 8°    |

#### 技术要求:

1. 树脂体不应有崩裂、缺损等缺陷;
2. 树脂上下部X、Y方向偏差不得超过0.20;
3. 胶体两端留胶总宽度和宽度不得超过0.50;
4. 所有单位为mm;



## Disclaimer

The information presented in this document is for reference only. Yangzhou Yangjie Electronic Technology Co., Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise.

The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), Yangjie or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale.

This publication supersedes & replaces all information previously supplied. For additional information, please visit our website [http:// www.21yangjie.com](http://www.21yangjie.com) , or consult your nearest Yangjie's sales office for further assistance.