



# YJD50N06A

## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

|                                   |         |
|-----------------------------------|---------|
| $V_{DS}$                          | 60 V    |
| $I_D$                             | 50 A    |
| $R_{DS(ON)}$ ( at $V_{GS}=10V$ )  | 15 mohm |
| $R_{DS(ON)}$ ( at $V_{GS}=4.5V$ ) | 17 mohm |
| 100% EAS Tested                   |         |
| 100% $V_{DS}$ Tested              |         |

### General Description

Trench Power MV MOSFET technology  
Excellent package for heat dissipation  
High density cell design for low  $R_{DS(ON)}$   
Moisture Sensitivity Level 1  
Epoxy Meets UL 94 V-0 Flammability Rating  
alogen Free

### Applications

DC-DC Converters  
Power management functions  
Motor Drive applications

### Absolute Maximum Ratings ( $T_A=25$ unless otherwise noted)

| Parameter                 | Symbol   | Limit    | Unit |
|---------------------------|----------|----------|------|
| Drain-source Voltage      | $V_{DS}$ | 60       | V    |
| Gate-source Voltage       | $V_{GS}$ | $\pm 20$ | V    |
| Drain Current<br>$T_C=25$ | $I_D$    | 50       |      |



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

| Parameter                             | Symbol                | Conditions   | Min | Typ  | Max   | Units |
|---------------------------------------|-----------------------|--|-----|------|-------|-------|
| <b>Static Parameter</b>               |                       |  |     |      |       |       |
| Drain-Source Breakdown Voltage        | BV <sub>DSS</sub>     | V <sub>GS</sub> = 0V, I <sub>D</sub> =250  | 60  |      |       | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>      | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V  |     |      | 1     |       |
| 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> =250                                | 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> =15A   |     | 11   | 15    | m     |
|                                       |                       | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =10A  |     | 13.5 | 17    |       |
| Diode Forward Voltage                 | V <sub>SD</sub>       | I <sub>S</sub> =15A, V <sub>GS</sub> =0V   |     | 0.80 | 1.2   | V     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>        |  |     |      | 50    | A     |
| Gate resistance                       | R <sub>g</sub>        |  |     | 2.1  |       |       |
| <b>Dynamic Parameters</b>             |                       |  |     |      |       |       |
| Input Capacitance                     | C <sub>iss</sub>      | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1MHZ                                      |     | 2585 |       | pF    |
| Output Capacitance                    | C <sub>oss</sub>      |  |     | 150  |       |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>      |  |     | 77.5 |       |       |
| <b>Switching Parameters</b>           |                       |  |     |      |       |       |
| Total Gate Charge                     | Q <sub>g</sub> (10V)  | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =20A                        |     | 51   |       | nC    |
| Total Gate Charge                     | Q <sub>g</sub> (4.5V) |  |     | 24   |       |       |
| Gate-Source Charge                    | Q <sub>gs</sub>       |  |     | 9.5  |       |       |
| Gate-Drain Charge                     | Q <sub>gd</sub>       |  |     | 10   |       |       |
| Reverse Recovery Charge               | Q <sub>rr</sub>       | I <sub>r</sub> =20A, di/dt=100A/us   |     | 17   |       |       |
| Reverse Recovery Time                 | t <sub>rr</sub>       |  |     | 14   |       |       |
| Turn-on Delay Time                    | t <sub>D(on)</sub>    | V <sub>GS</sub> =10V, V <sub>DD</sub> =30V, I <sub>D</sub> =20A<br>R <sub>GEN</sub> =3 |     | 11   |       | ns    |
| Turn-on Rise Time                     | t <sub>r</sub>        |  |     | 25   |       |       |
| Turn-off Delay Time                   | t <sub>D(off)</sub>   |  |     | 89   |       |       |
| Turn-off fall Time                    | t <sub>f</sub>        |  |     | 79   |       |       |

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

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=150, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. The value of R<sub>JA</sub> is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25.

D. T<sub>J</sub>=25, V<sub>DD</sub>=55V, V<sub>G</sub>=10V, L=0.5mH.



## Typical Performance Characteristics

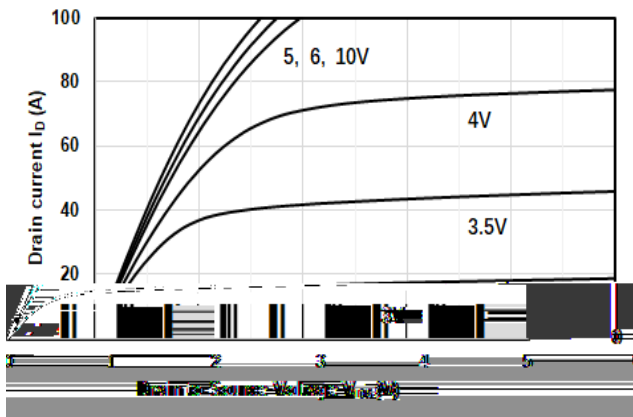


Figure1. Output Characteristics

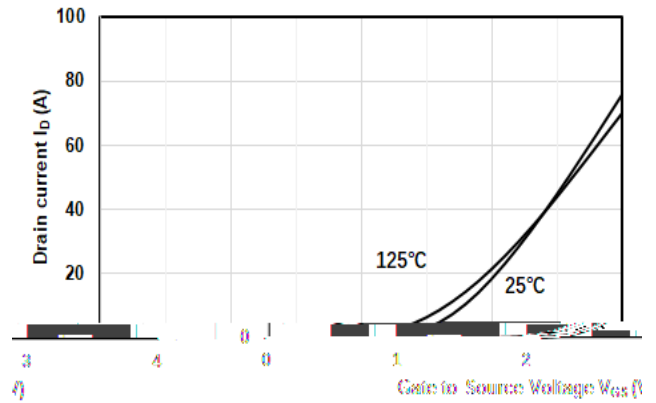


Figure2. Transfer Characteristics

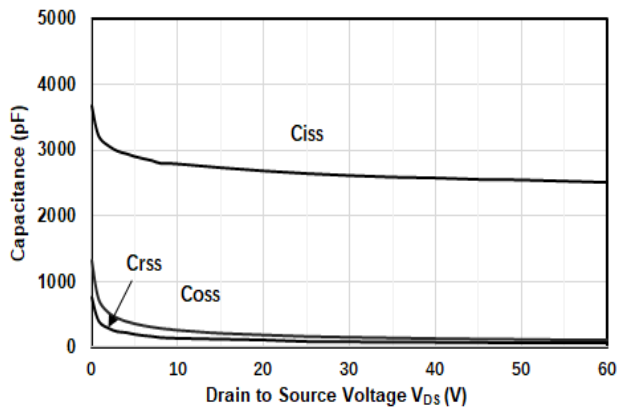


Figure3. Capacitance Characteristics

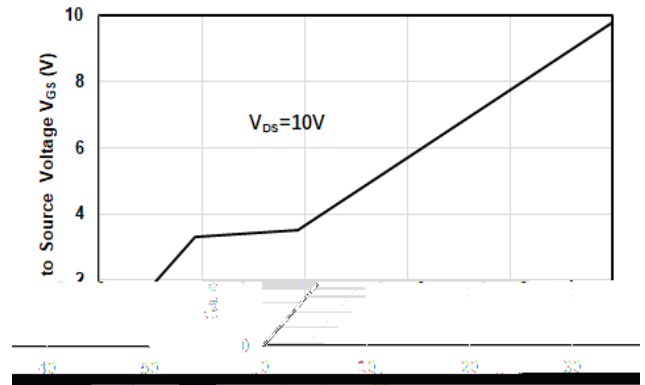


Figure4. Gate Charge

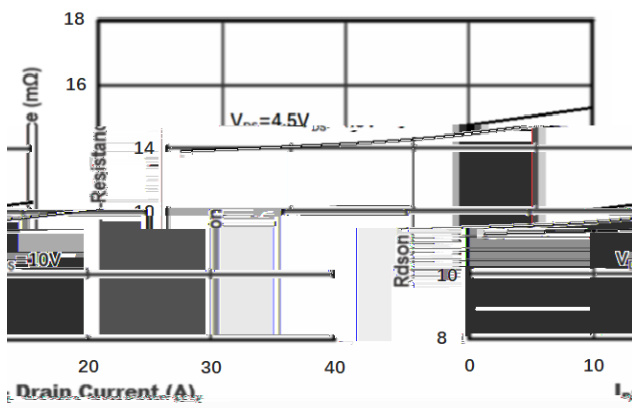


Figure5. Drain-Source on Resistance

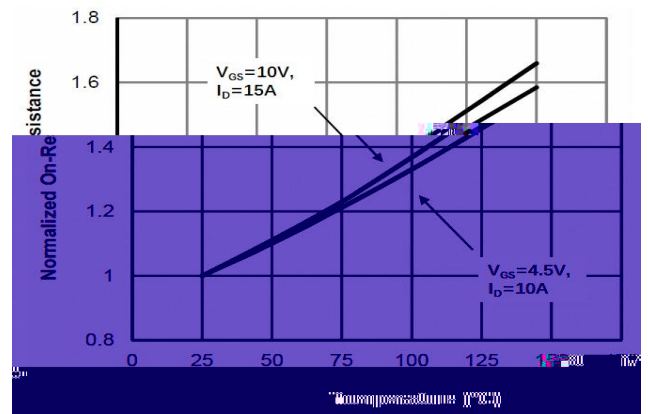


Figure6. Drain-Source on Resistance



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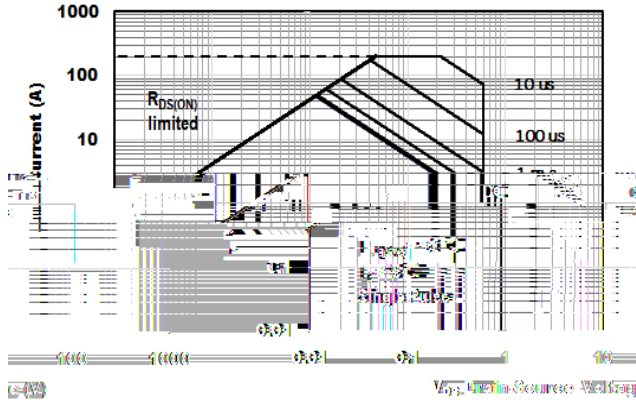


Figure 7. Safe Operation Area

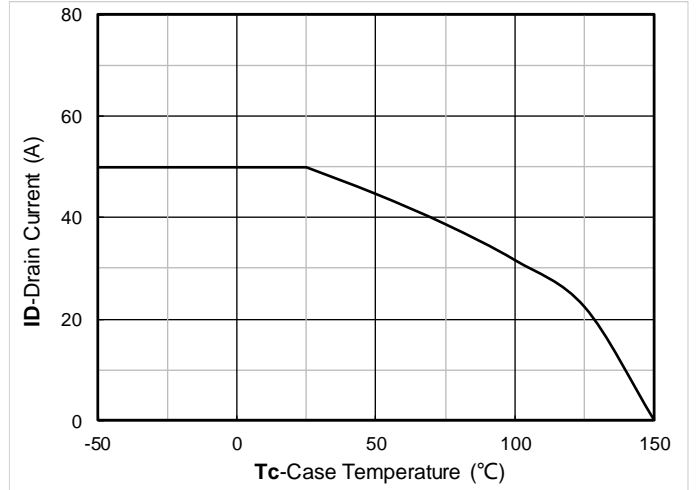


Figure 8. Drain current vs. Case Temperature

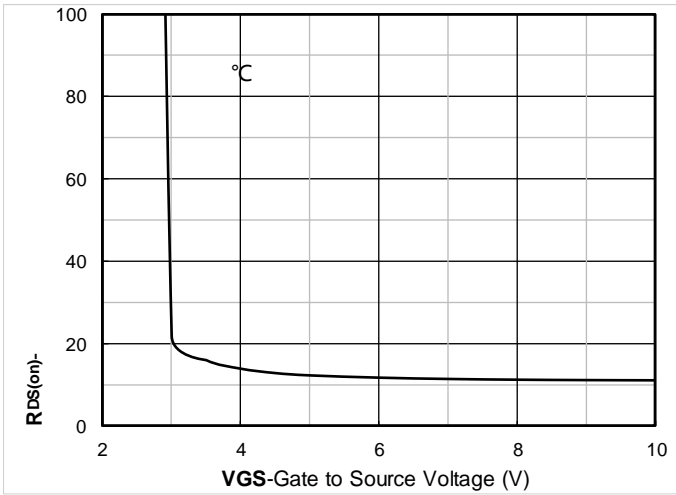


Figure 9. On-Resistance vs Gate to Source Voltage

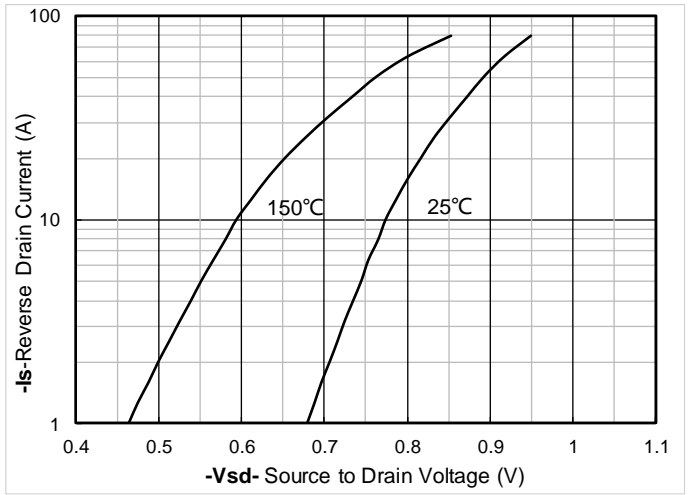


Figure 10. Forward characteristics of reverse diode

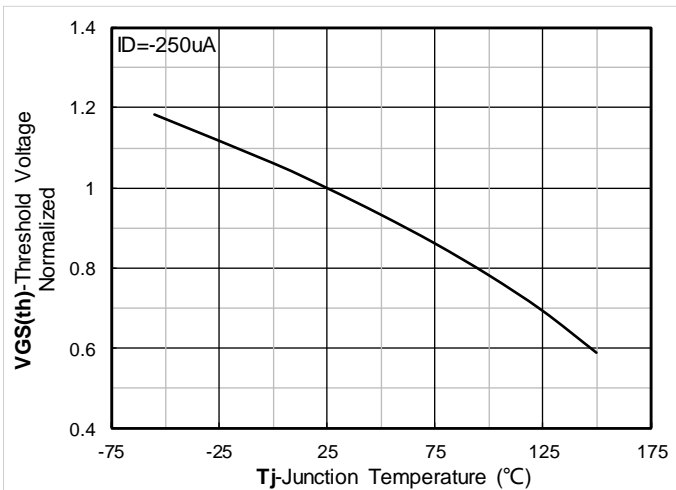


Figure 11. Normalized Threshold voltage

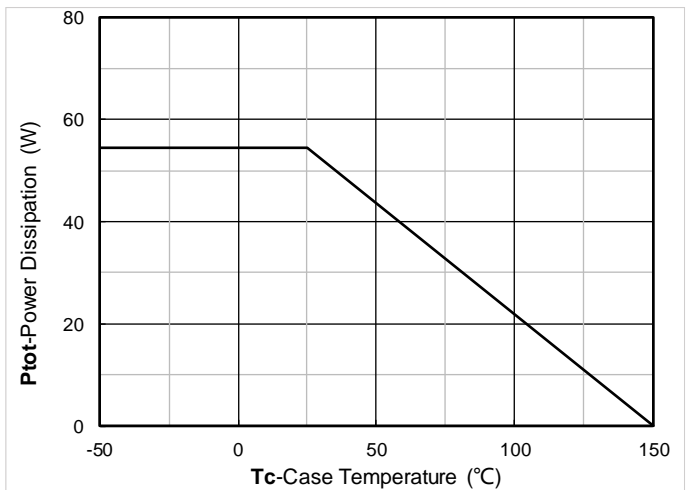


Figure 12. Power dissipation



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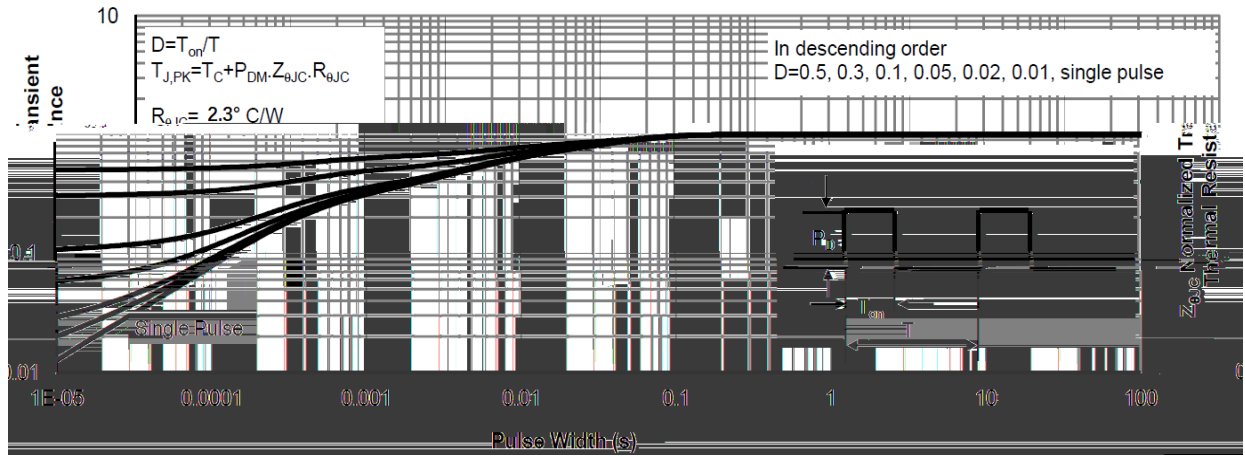
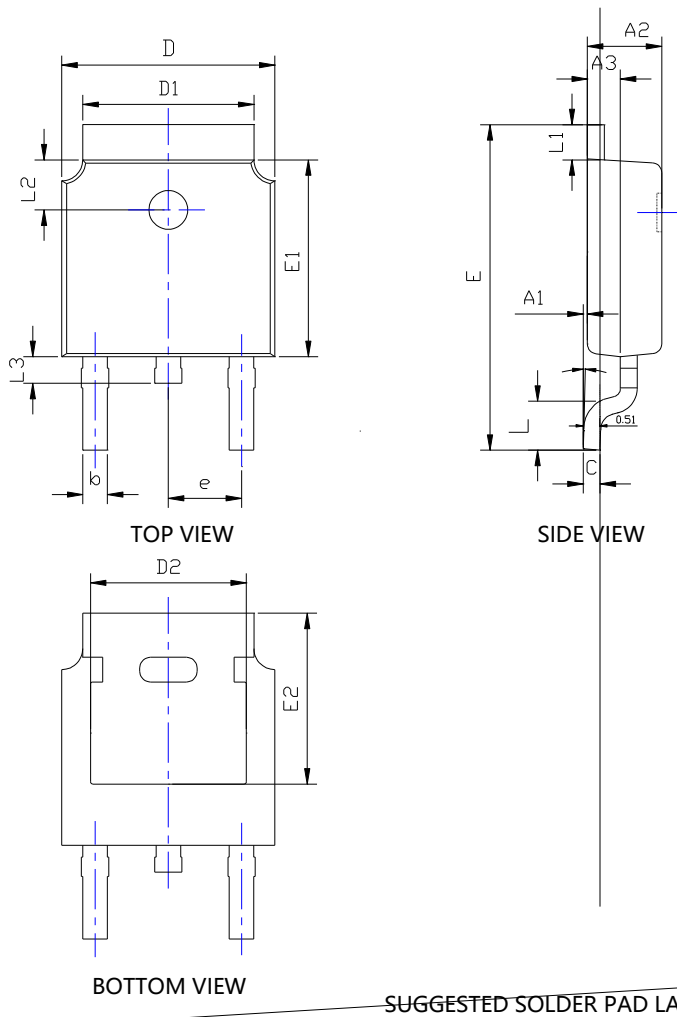


Figure13. Normalized Maximum Transient Thermal Impedance



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## TO-252-B Package information



| SYMBOL | DIMENSIONS |       |            |      |        |
|--------|------------|-------|------------|------|--------|
|        | INCHES     |       | Millimeter |      |        |
|        | MIN.       | NOM.  | MIN.       | MAX. |        |
| A1     | 0.000      |       |            |      | 0.200  |
| A2     | 0.087      | 0.091 |            |      | 2.400  |
| A3     | 0.035      | 0.039 |            |      | 1.100  |
| b      | 0.026      | 0.030 |            |      | 0.860  |
| c      | 0.018      | 0.020 |            |      | 0.580  |
| D      | 0.256      | 0.260 |            |      | 6.700  |
| D1     |            |       |            |      |        |
| D2     | 0.181      | 0.189 | 4.600      |      | 4.950  |
| E      | 0.390      | 0.398 | 9.900      |      | 10.300 |
| E1     | 0.236      | 0.240 | 6.0        |      | 6.200  |

NOTE:  
 1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS.  
 2. TOLERANCE 0.1mm UNLESS OTHERWISE SPECIFIED.  
 3. THE PAD LAYOUT IS FOR REFERENCE PURPOSES ONLY.

SUGGESTED SOLDER PAD LAYOUT



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