

## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

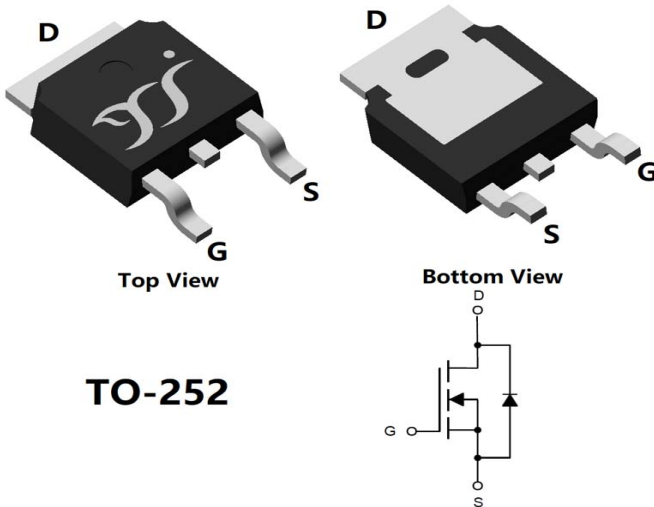
- $V_{DS}$  100V
- $I_D$  45A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ ) <17 mohm
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

### General Description

- Low  $R_{DS(on)}$  & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and soft recovery
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

### Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



**TO-252**

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

| Parameter                              |                         | Symbol         | Limit    | Unit             |
|----------------------------------------|-------------------------|----------------|----------|------------------|
| Drain-source Voltage                   |                         | $V_{DS}$       | 100      | V                |
| Gate-source Voltage                    |                         | $V_{GS}$       | $\pm 20$ | V                |
| Drain Current                          | $T_A=25^\circ\text{C}$  | $I_D$          | 7.5      | A                |
|                                        | $T_A=100^\circ\text{C}$ |                | 4.5      |                  |
|                                        | $T_C=25^\circ\text{C}$  |                | 45       |                  |
|                                        | $T_C=100^\circ\text{C}$ |                | 28.5     |                  |
| Pulsed Drain Current <sup>A</sup>      |                         | $I_{DM}$       | 180      | A                |
| Avalanche energy <sup>B</sup>          |                         | $E_{AS}$       | 81       | mJ               |
| Total Power Dissipation <sup>C</sup>   | $T_A=25^\circ\text{C}$  | $P_D$          | 2.5      | W                |
|                                        | $T_A=100^\circ\text{C}$ |                | 1        |                  |
|                                        | $T_C=25^\circ\text{C}$  |                | 72       |                  |
|                                        | $T_C=100^\circ\text{C}$ |                | 28.8     |                  |
| Junction and Storage Temperature Range |                         | $T_J, T_{STG}$ | -55~+150 | $^\circ\text{C}$ |

### ■ Thermal resistance

| Parameter                                           |              | Symbol          | Typ  | Max | Units              |
|-----------------------------------------------------|--------------|-----------------|------|-----|--------------------|
| Thermal Resistance Junction-to-Ambient <sup>D</sup> | $t \leq 10S$ | $R_{\theta JA}$ | 15   | 20  | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-to-Ambient <sup>D</sup> | Steady-State |                 | 40   | 50  |                    |
| Thermal Resistance Junction-to-Case                 | Steady-State | $R_{\theta JC}$ | 1.35 | 1.7 |                    |

### ■ Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking   | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|-----------|----------------------|-------------------------|----------------------------|---------------|
| YJD45G10B     | F1/F2        | YJD45G10B | 2500                 | /                       | 25000                      | 13"Reel       |



# YJD45G10B

## ■ Electrical Characteristics (T<sub>j</sub>=25°C 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                                              | 100 |      |       | V     |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>DS</sub> =100,V <sub>GS</sub> =0V                                                 |     |      | 1     | μA    |
| 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                                | 2   | 2.8  | 4     | V     |
| Static Drain-Source On-Resistance     | R <sub>DS(ON)</sub> | V <sub>GS</sub> = 10V, I <sub>D</sub> =20A                                               |     | 14   | 17    | mΩ    |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =20A,V <sub>GS</sub> =0V                                                  |     |      | 1.3   | V     |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |                                                                                          |     |      | 45    | A     |
| Gate resistance                       | R <sub>G</sub>      | f= 1 MHz                                                                                 |     | 1    |       | Ω     |
| Dynamic Parameters                    |                     |                                                                                          |     |      |       |       |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>DS</sub> =50V,V <sub>GS</sub> =0V,f=1MHZ                                          |     | 1135 |       | pF    |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                          |     | 399  |       |       |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |                                                                                          |     | 18   |       |       |
| Switching Parameters                  |                     |                                                                                          |     |      |       |       |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =10V,V <sub>DS</sub> =50V,I <sub>D</sub> =25A                            |     | 16   |       | nC    |
| Gate-Source Charge                    | Q <sub>gs</sub>     |                                                                                          |     | 5.6  |       |       |
| Gate-Drain Charge                     | Q <sub>gd</sub>     |                                                                                          |     | 2.4  |       |       |
| Reverse Recovery Chrage               | Q <sub>rr</sub>     | I <sub>F</sub> =20A, di/dt=100A/us                                                       |     | 42   |       | ns    |
| Reverse Recovery Time                 | t <sub>rr</sub>     |                                                                                          |     | 39.8 |       |       |
| Turn-on Delay Time                    | t <sub>D(on)</sub>  | V <sub>GS</sub> =10V, V <sub>DD</sub> =50V,I <sub>D</sub> =25A<br>R <sub>GEN</sub> =2.2Ω |     | 39.2 |       |       |
| Turn-on Rise Time                     | t <sub>r</sub>      |                                                                                          |     | 11   |       |       |
| Turn-off Delay Time                   | t <sub>D(off)</sub> |                                                                                          |     | 53.2 |       |       |
| Turn-off fall Time                    | t <sub>f</sub>      |                                                                                          |     | 15.8 |       |       |

- A. Repetitive rating; pulse width limited by max. junction temperature.  
 B. V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=18A.  
 C. Pd is based on max. junction temperature, using junction-case thermal resistance.  
 D. The value of R<sub>θJA</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°C. The Power dissipation PDSM is based on R<sub>θJA</sub> ≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.



## ■ Typical Performance Characteristics

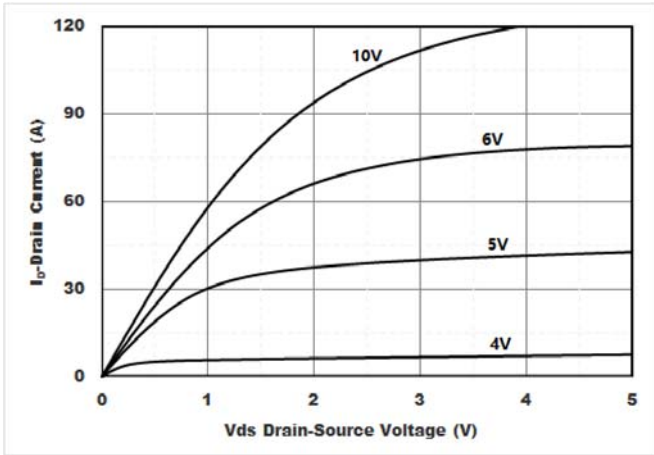


Figure1. Output Characteristics

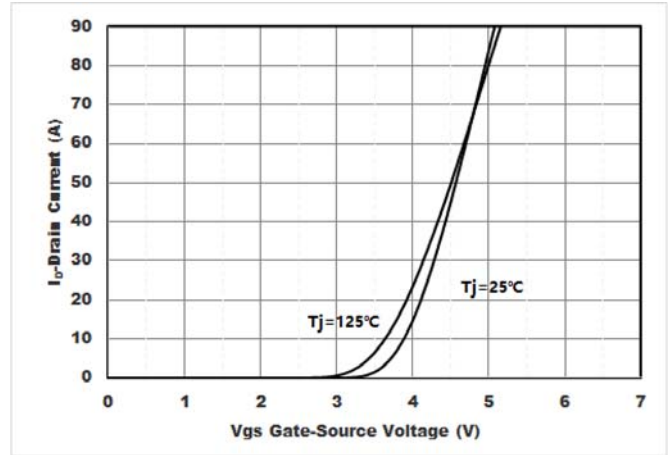


Figure2. Transfer Characteristics

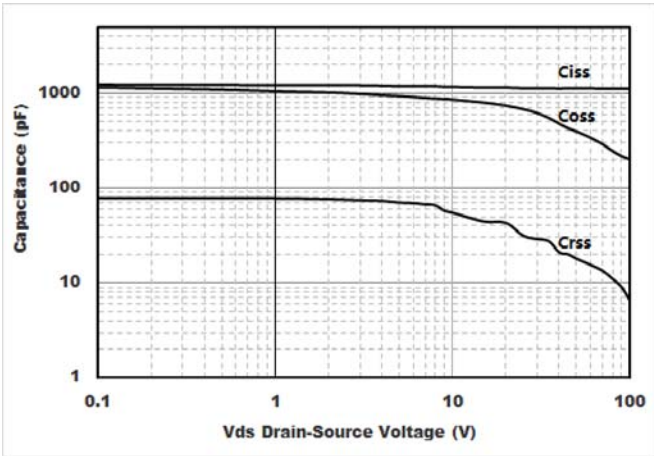


Figure3. Capacitance Characteristics

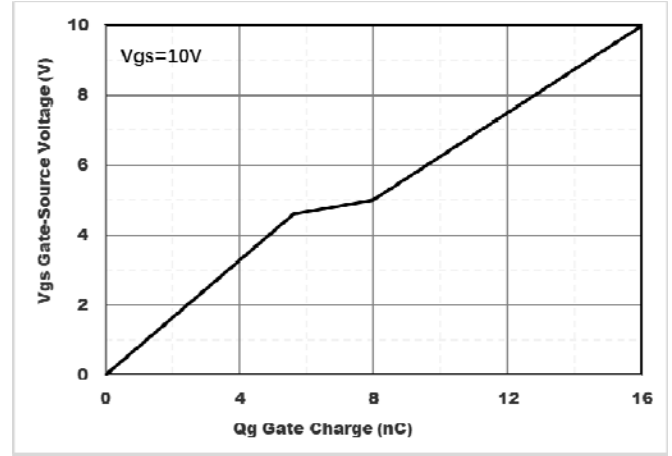


Figure4. Gate Charge

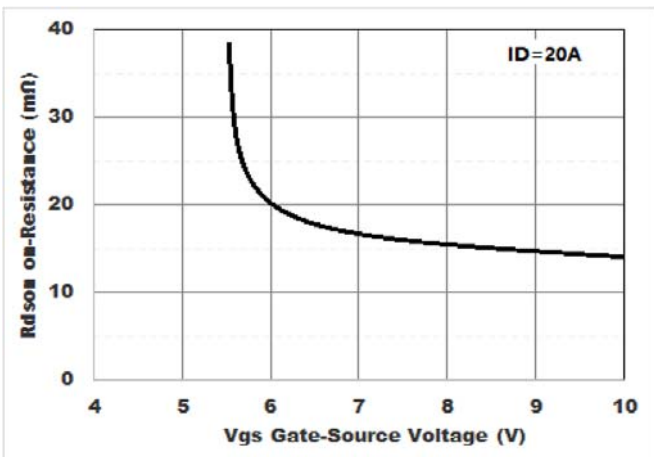


Figure5. On-Resistance vs. Drain Current and Gate Voltage

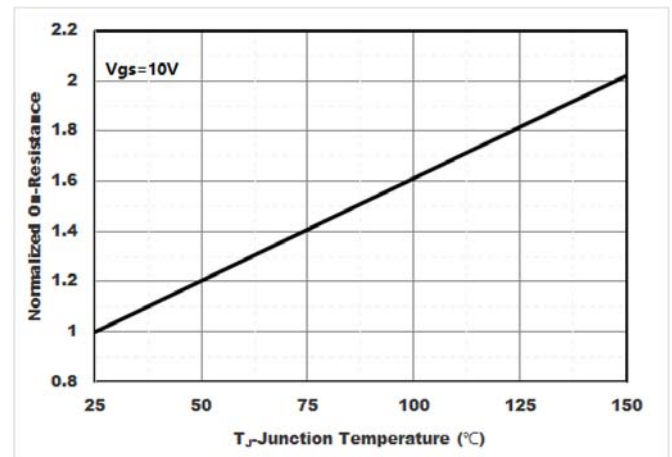


Figure6. Normalized On-Resistance



## YJD45G10B

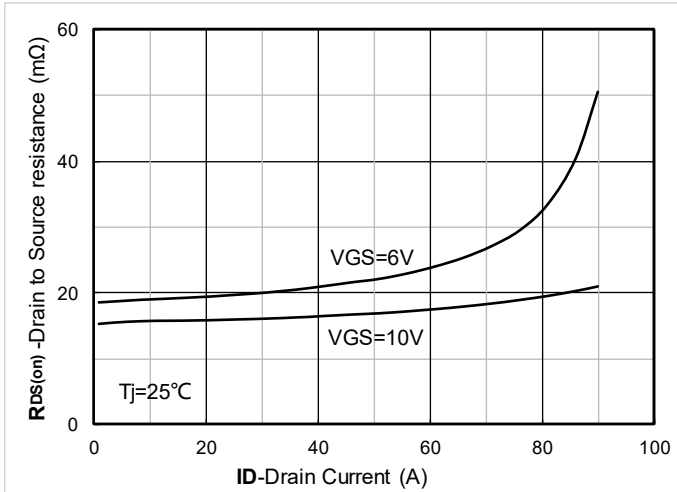


Figure 7. RDS(on) VS Drain Current

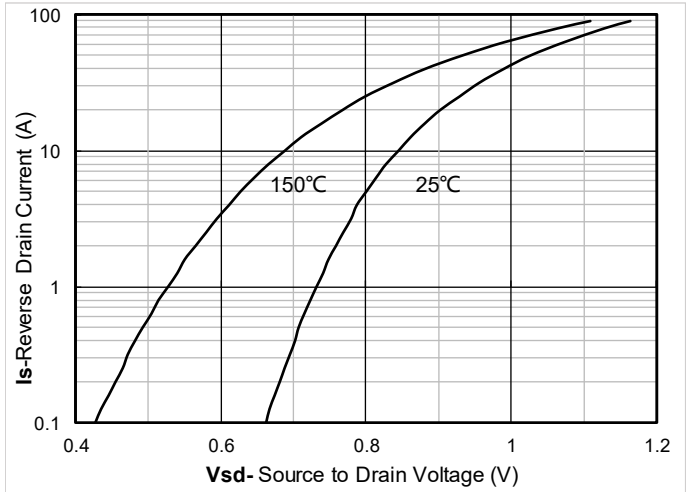


Figure 8. Forward characteristics of reverse diode

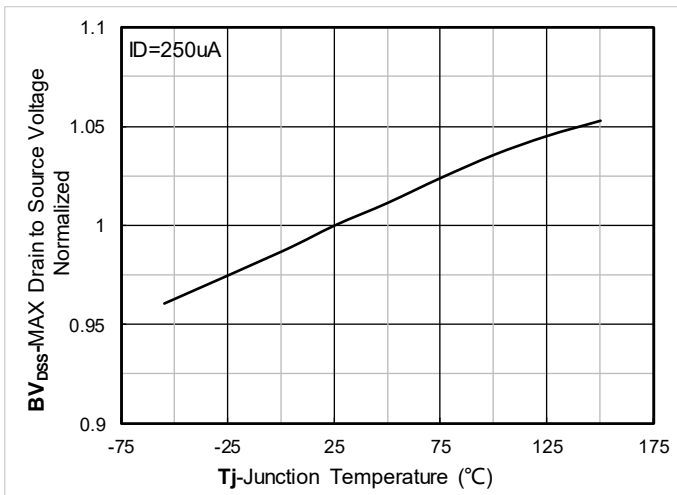


Figure 9. Normalized breakdown voltage

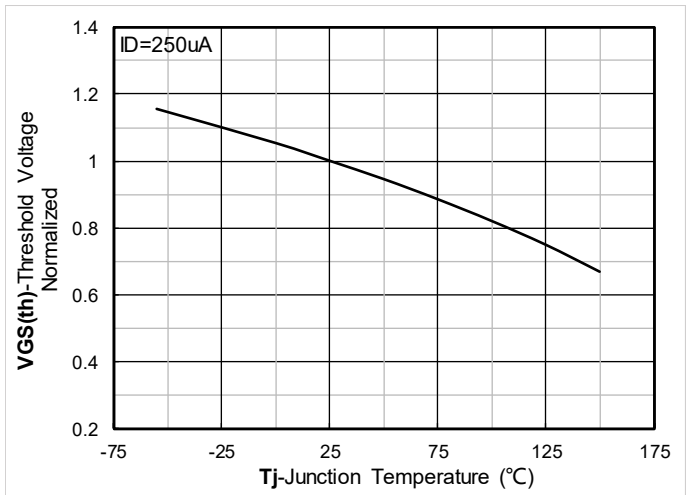


Figure 10. Normalized Threshold voltage

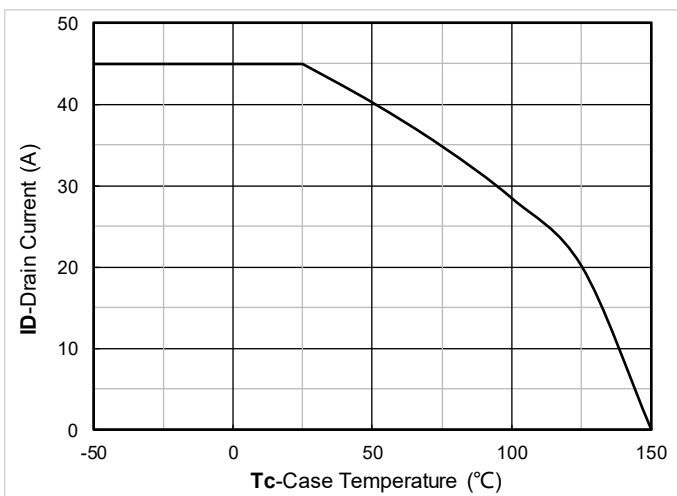


Figure 11. Current dissipation

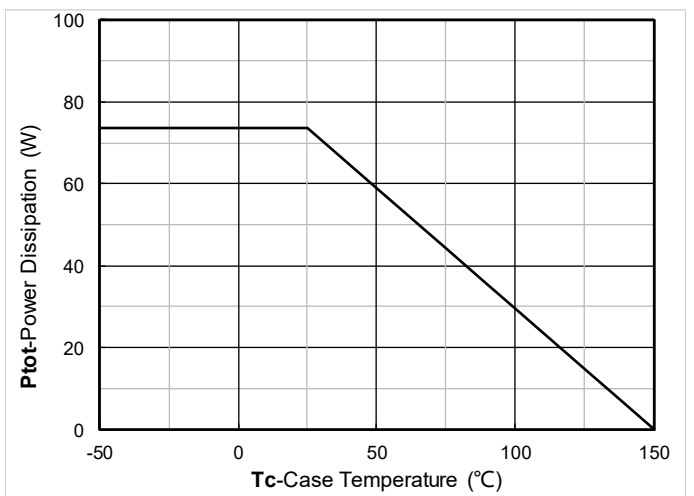


Figure 12. Power dissipation

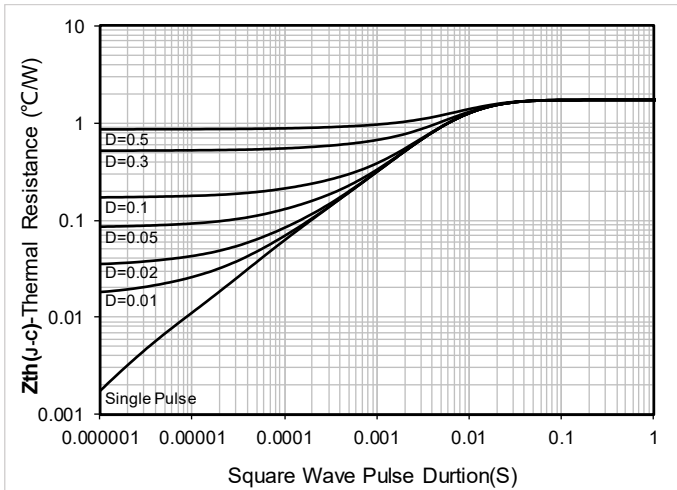


Figure 13. Maximum Transient Thermal Impedance

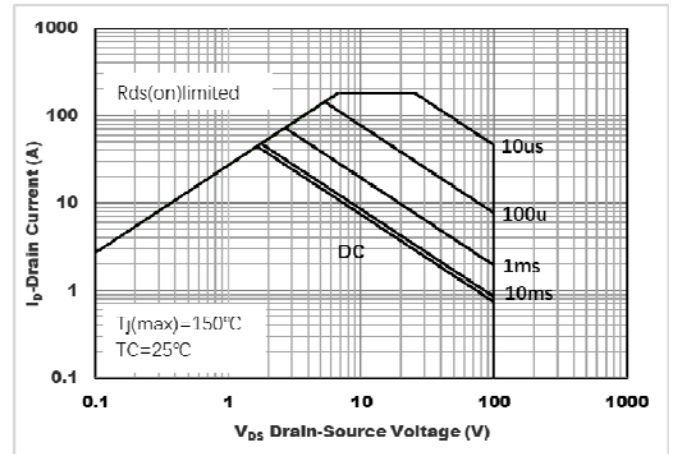
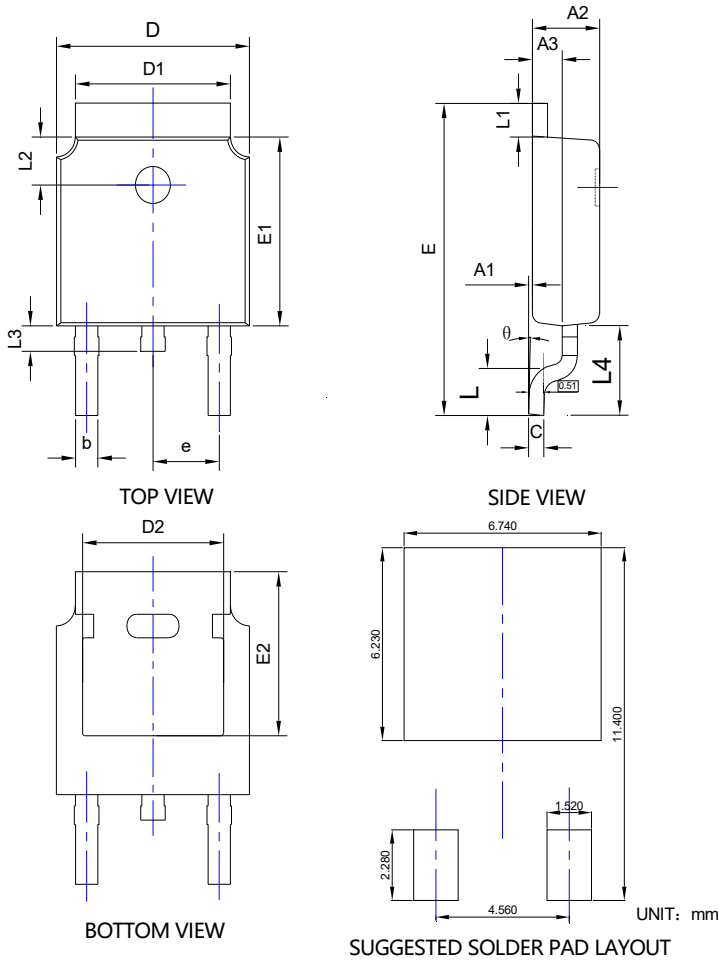


Figure 14. Safe Operation Area



## YJD45G10B

### ■ TO-252-B Package information



| SYMBOL   | DIMENSIONS |       |       |            |        |        |
|----------|------------|-------|-------|------------|--------|--------|
|          | INCHES     |       |       | Millimeter |        |        |
|          | MIN.       | NOM.  | MAX.  | MIN.       | NOM.   | MAX.   |
| A1       | 0.000      | ---   | 0.008 | 0.000      | ---    | 0.200  |
| A2       | 0.087      | 0.091 | 0.094 | 2.200      | 2.300  | 2.400  |
| A3       | 0.035      | 0.039 | 0.043 | 0.900      | 1.000  | 1.100  |
| b        | 0.026      | 0.030 | 0.034 | 0.660      | 0.760  | 0.860  |
| c        | 0.018      | 0.020 | 0.023 | 0.460      | 0.520  | 0.580  |
| D        | 0.256      | 0.260 | 0.264 | 6.500      | 6.600  | 6.700  |
| D1       | 0.203      | 0.209 | 0.215 | 5.150      | 5.300  | 5.450  |
| D2       | 0.181      | 0.189 | 0.195 | 4.600      | 4.800  | 4.950  |
| E        | 0.390      | 0.398 | 0.406 | 9.900      | 10.100 | 10.300 |
| E1       | 0.236      | 0.240 | 0.244 | 6.000      | 6.100  | 6.200  |
| E2       | 0.203      | 0.209 | 0.215 | 5.150      | 5.300  | 5.450  |
| e        | 0.090BSC   |       |       | 2.286BSC   |        |        |
| L        | 0.049      | 0.059 | 0.069 | 1.250      | 1.500  | 1.750  |
| L1       | 0.035      | ---   | 0.050 | 0.900      | ---    | 1.270  |
| L2       | 0.055      | ---   | 0.075 | 1.400      | ---    | 1.900  |
| L3       | 0.024      | 0.031 | 0.039 | 0.600      | 0.800  | 1.000  |
| L4       | 0.114REF   |       |       | 2.900REF   |        |        |
| $\theta$ | 0°         | ---   | 10°   | 0°         | ---    | 10°    |

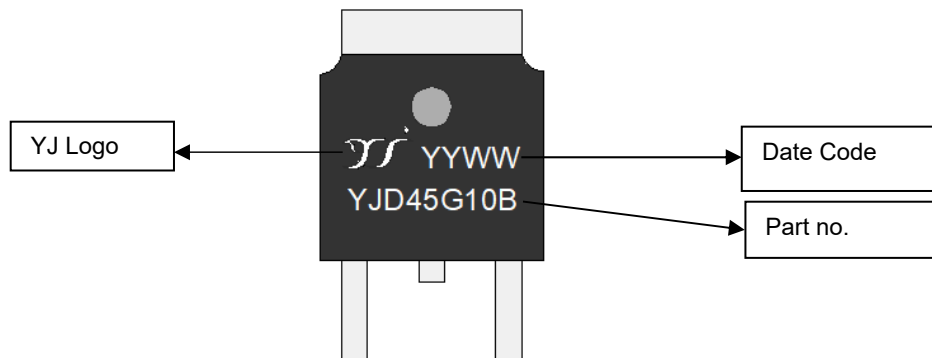
#### NOTE:

- 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.



## YJD45G10B

### ■ Marking Information



**Note:**

1. All marking is at middle of the product body
2. All marking is in laser printing
3. YJD45G10B is part no., YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black



## 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.