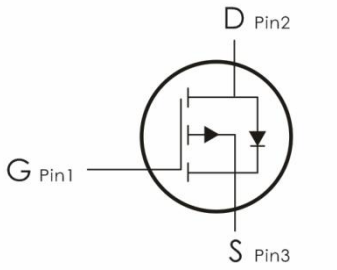
## Description：

This P-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.


## Features：

1) $V_{DS}$=-40V,$I_D$=-45A,$R_{DS(ON)}$<12mΩ @$V_{GS}$=-10V（Type：10mΩ）
2) Low gate charge.
3) Green device available.
4) Advanced high cell denity trench technology for ultra low $R_{DS(ON)}$.
5) Excellent package for good heat dissipation.

## Package Marking and Ordering Information：

| Part NO. | Marking | Package | Packing |
|---|---|---|---|
| DOU45P04 | 45P04 | TO- 251 | 80 pcs/Tube |

## Absolute Maximum Ratings：($T_C$=25℃ unless otherwise noted)

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -40 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Continuous Drain Current | -45 | A |
| | Continuous Drain Current-$T_C$=100℃ | -27 | |
| $I_{DM}$ | Pulsed Drain Current [1] | -180 | |
| $P_D$ | Power Dissipation | 40 | W |
| $E_{AS}$ | Single pulse avalanche energy [2] | 100 | mJ |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -55-+150 | ℃ |

## Thermal Characteristics：

| Symbol | Parameter | Max | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance,Junction to Case | 3.1 | ℃/W |

## Electrical Characteristics: ($T_C$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Sourtce Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | -40 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$=0V, $V_{DS}$=-40V | --- | --- | -1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | -1.1 | -1.5 | -2.2 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance[3] | $V_{GS}$=-10V,$I_D$=-15A | --- | 10 | 12 | mΩ |
| | | $V_{GS}$=-4.5V,$I_D$=-10A | --- | 14 | 17 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-20V, $V_{GS}$=0V, f=1MHz | --- | 1897 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 270 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 215 | --- | |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=-20V, $I_D$=-11A, $R_{ENG}$=2.5Ω,$V_{GS}$=-10V | --- | 10 | --- | ns |
| $t_r$ | Rise Time | | --- | 21 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 53 | --- | ns |
| $t_f$ | Fall Time | | --- | 29 | --- | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$=-10V, $V_{DS}$=-20V, $I_D$=-11A | --- | 36 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 6.5 | --- | nC |
| $Q_{gd}$ | Gate-Drain “Miller” Charge | | --- | 7.6 | --- | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V, $I_{SD}$=-11A | --- | --- | 1.2 | V |
| $I_S$ | Continuous Drain Curren | $V_D$=$V_G$=0V | --- | --- | -45 | A |
| $I_{SM}$ | Pulsed Drain Current | | --- | --- | -180 | A |
| Trr | Reverse Recovery Time | $I_F$=-11A,$T_J$=25℃ dI/dt=100A/us | --- | 35 | --- | ns |
| Qrr | Reverse Recovery Charge | | --- | 40 | --- | nC |

## Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition : TJ=25℃,VDD=-20V,$V_G$ =10V,L=0.5mH
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Test Circuit

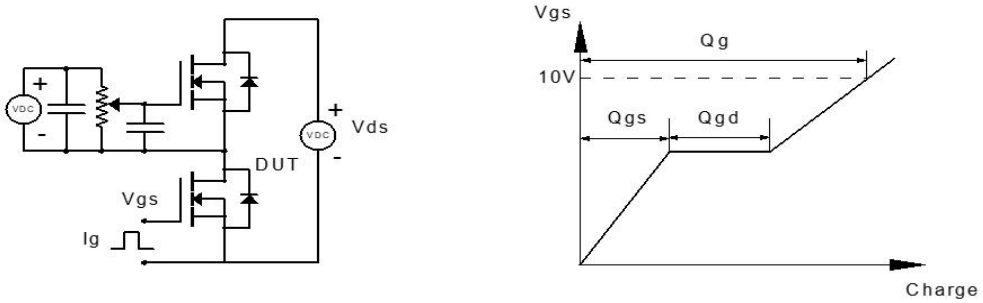



**Figure 1: Gate Charge Test Circuit & Waveform**

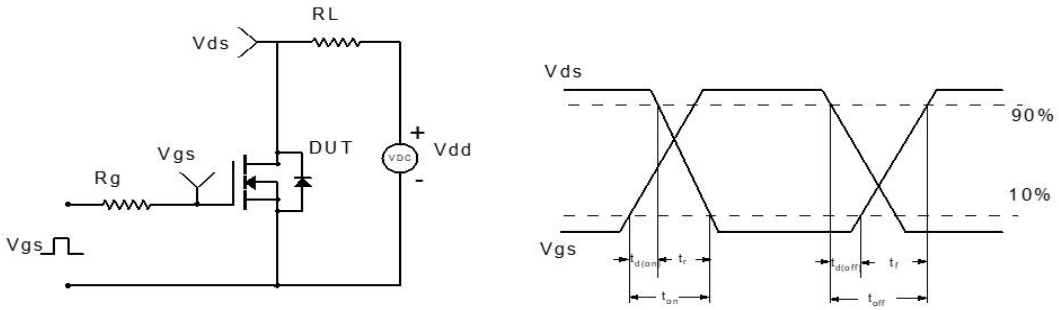



**Figure 2: Resistive Switching Test Circuit & Waveform**

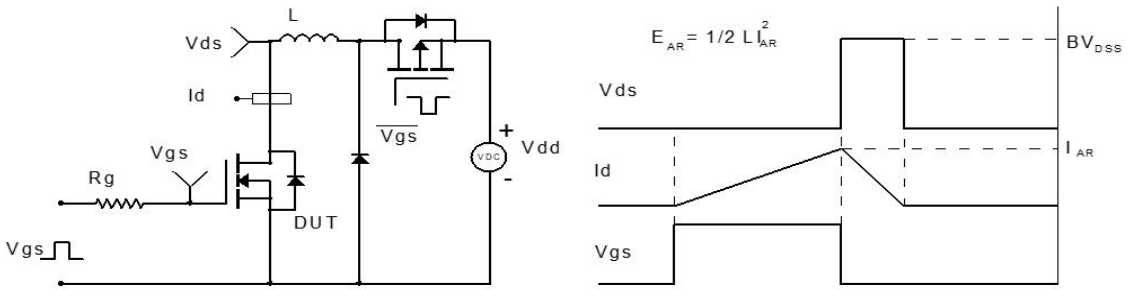



**Figure 3: Unclamped Inductive Switching Test Circuit& Waveform**

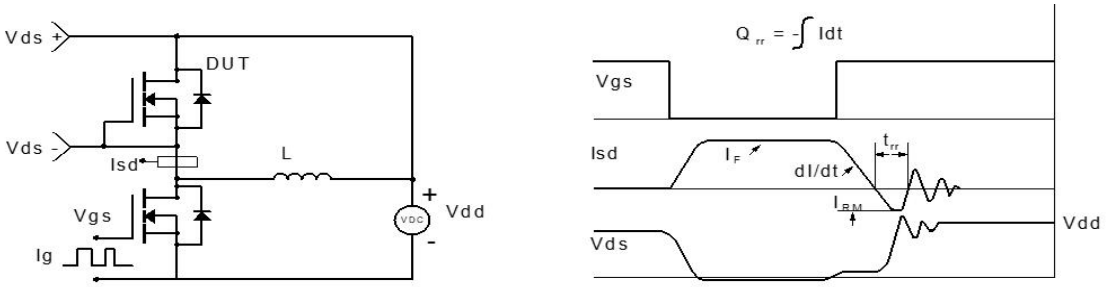
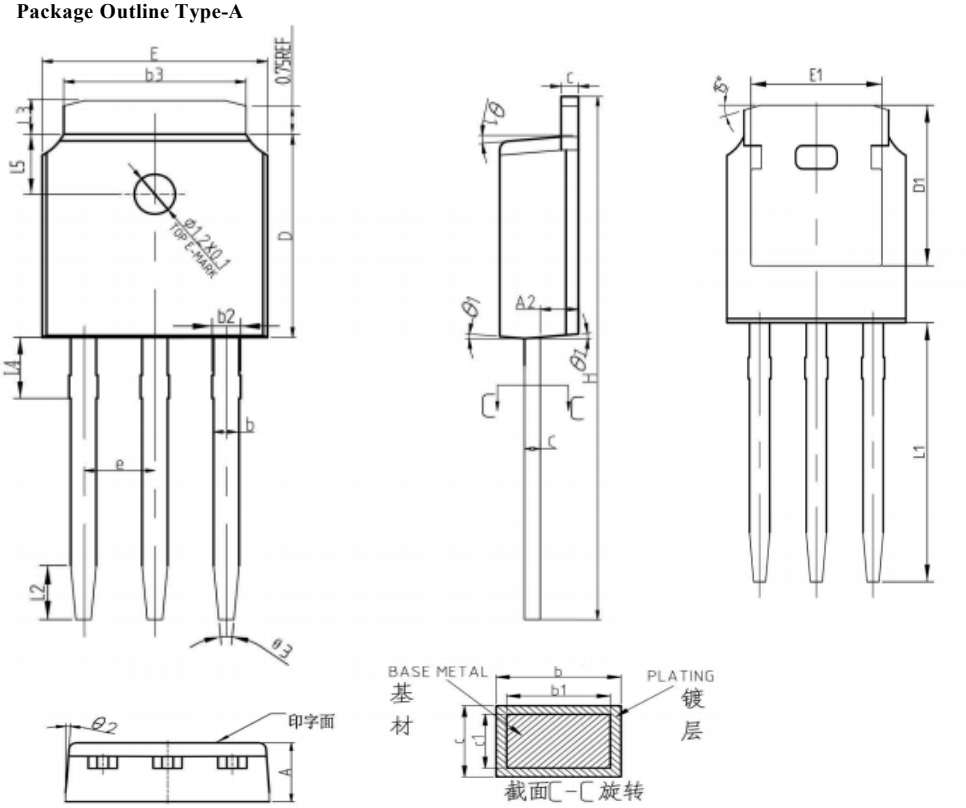



**Figure 4: Diode Recovery Test Circuit & Waveform**

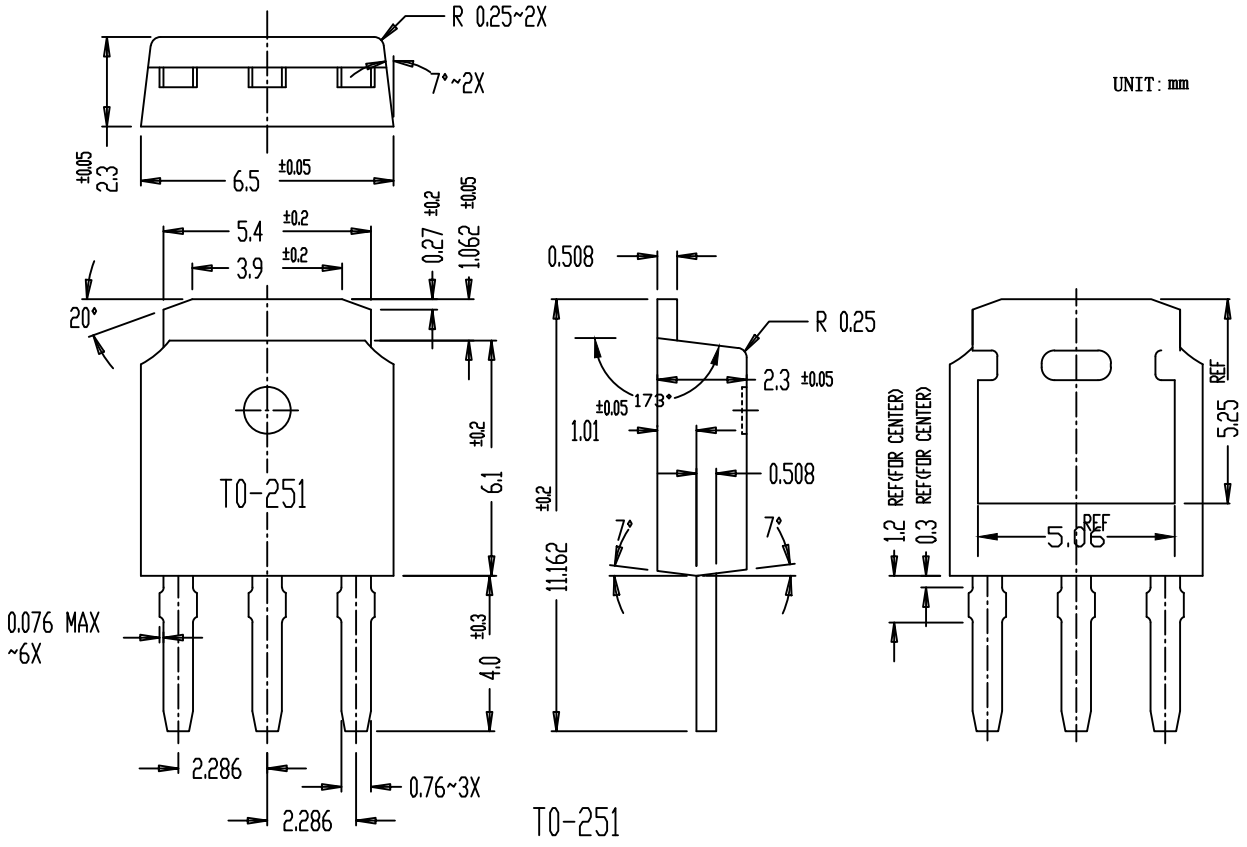
# TO-251 Package Information

**Package Outline Type-A**

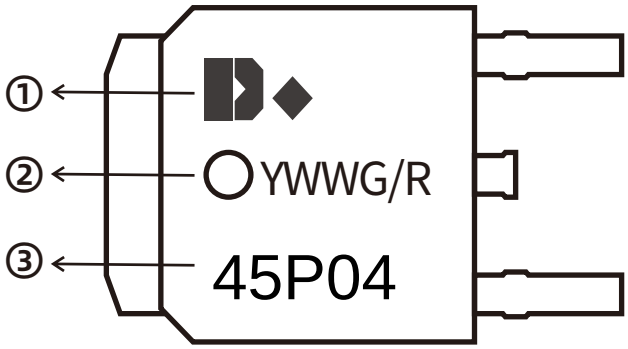



| SYMBOL | mm | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| *A | 2.20 | 2.30 | 2.38 |
| *A2 | 0.97 | 1.07 | 1.17 |
| *b | 0.72 | 0.78 | 0.85 |
| b1 | 0.71 | 0.76 | 0.81 |
| *b2 | 0.72 | 0.88 | 0.95 |
| *b3 | 5.23 | 5.33 | 5.46 |
| *c | 0.47 | 0.53 | 0.58 |
| c1 | 0.46 | 0.51 | 0.56 |
| *D | 6.00 | 6.10 | 6.20 |
| D1 | 5.30REF | | |
| *E | 6.50 | 6.60 | 6.70 |
| E1 | 4.70 | 4.83 | 4.92 |
| *e | 2.286BSC | | |
| *H | 16.10 | 16.40 | 16.60 |
| *L1 | 9.20 | 9.40 | 9.60 |
| L2 | 1.25 | 1.35 | 1.45 |
| *L3 | 0.90 | 1.02 | 1.22 |
| L4 | 0.95 | 1.05 | 1.15 |
| L5 | 1.70 | 1.80 | 1.90 |
| θ1 | 5° | 7° | 9° |
| θ2 | 5° | 7° | 9° |
| θ3 | 11° | 13° | 15° |
| 带*为检验尺寸 | | | |

**Package Outline Type-B**



## Marking Information：




①. Doingter LOGO

②. Date Code(YWWG / R)

Y：Year Code，last digit of the year

WW：Week Code(01-53)

G/R：G(Green) /R(Lead Free)

③. Part NO.

## Previous Version

| Version | Date | Subjects (major changes since last revision) |
|---|---|---|
| 1.0 | 2024-10-19 | Release of final version |

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