P-Ch 100V Fast Switching MOSFETs

## Features

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

## Product Summary

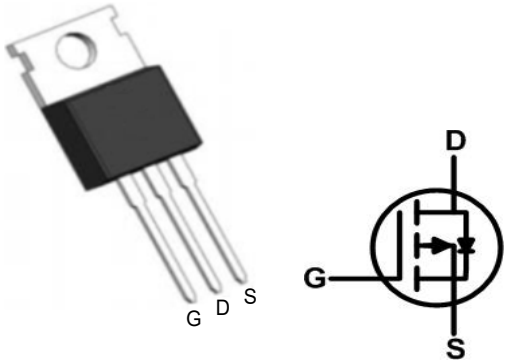
Green

| BVDSS | RDSON | ID |
|---|---|---|
| -100V | 22 mΩ | -80 A |

## Applications

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

## TO220AB Pin Configuration




## Absolute Maximum Ratings

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | -80 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V[1,6] | -41 | A |
| $I_{DM}$ | Pulsed Drain Current[2] | -260 | A |
| EAS | Single Pulse Avalanche Energy[3] | --- | mJ |
| $I_{AS}$ | Avalanche Current | --- | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation[4] | 250 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

## Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [1] | --- | 62 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 0.5 | ℃/W |

## Electrical Characteristics ($T_J$=25 ℃, unless otherwise noted)

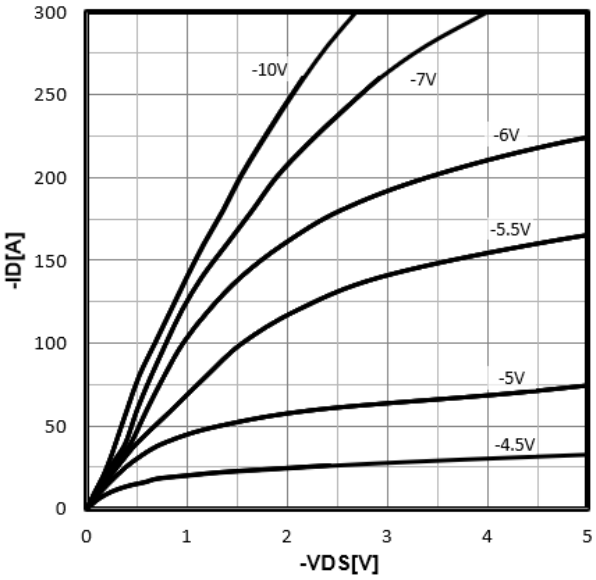
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V., $I_D$=-250uA | -100 | --- | --- | V |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25℃ , $I_D$=-1mA | --- | --- | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=-10V , $I_D$=-15A | --- | 22 | 25 | mΩ |
| | | $V_{GS}$=-4.5V , $I_D$=-3A | --- | --- | --- | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$ , $I_D$ =250uA | -2 | -3 | -4 | V |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | --- | --- | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=-100V , $V_{GS}$=0V , $T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=-100V, $V_{GS}$=0V , $T_J$=100℃ | --- | --- | --- | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-30V , $V_{GS}$=-10V , $I_D$=-3A | --- | 76 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 13 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 12.4 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{GS}$=-10V,$V_{DD}$=-50V, $R_L$=0.75Ω， $R_{GEN}$=3Ω $I_D$=-15A | --- | 13 | --- | ns |
| $T_r$ | Rise Time | | --- | 51 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 177 | --- | |
| $T_f$ | Fall Time | | --- | 82 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-50V , $V_{GS}$=0V , f=1MHz | --- | 4200 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 536 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 52 | --- | |

## Diode Characteristics

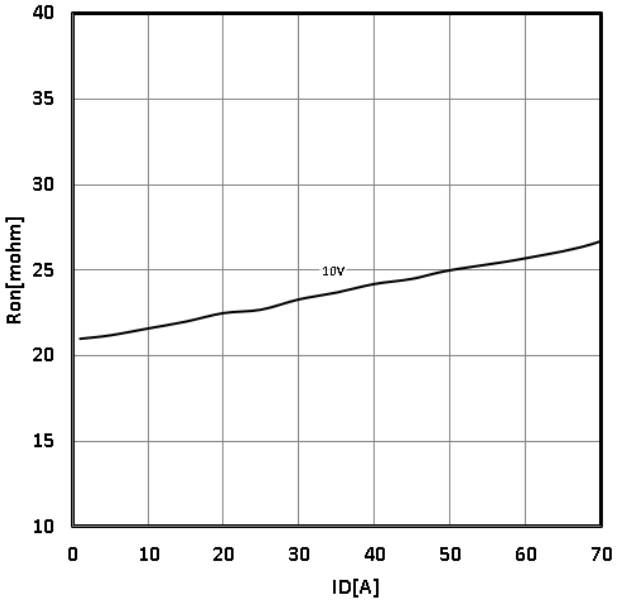
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current[1,4] | $V_G$=$V_D$=0V , Force Current | --- | --- | -80 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=-15A , $T_J$=25℃ | --- | --- | -1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | IF=-15A , di/dt=100A/μs , $T_J$= 2 5 ℃ | --- | 110 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 590 | --- | nC |

a1： Repetitive rating; pulse width limited by maximum junction temperature

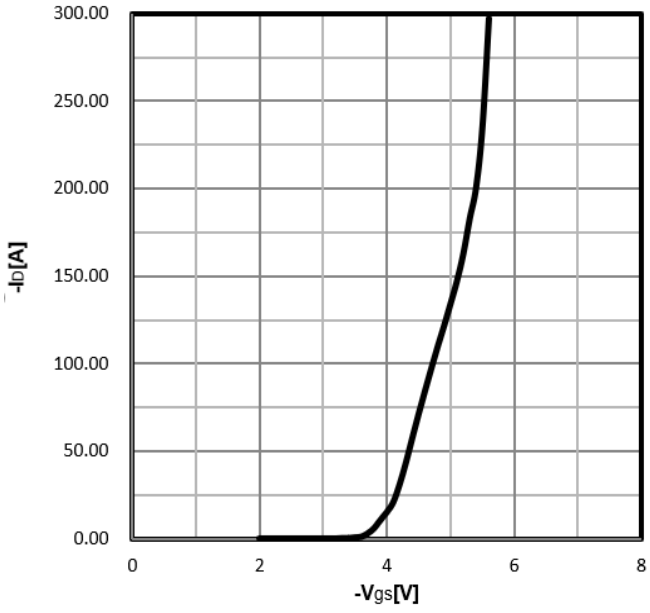
**Typ. output characteristics**
$I_D=f(V_{DS})$



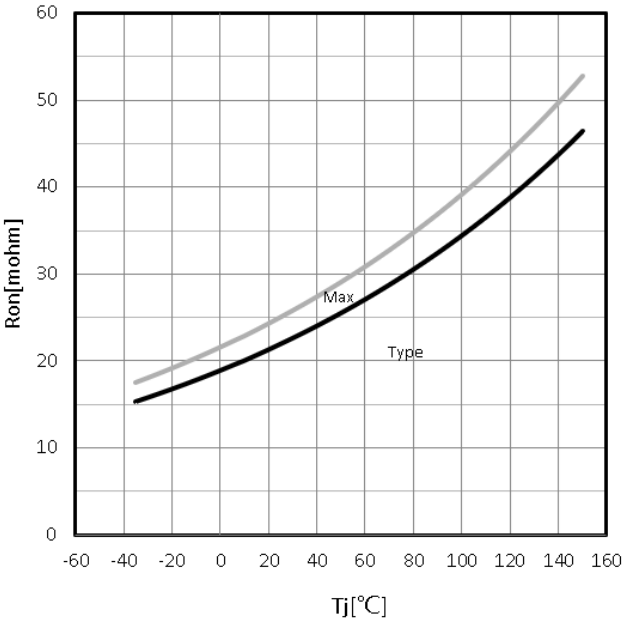

**Typ. drain-source on resistance**
$R_{DS(on)}=f(I_D)$



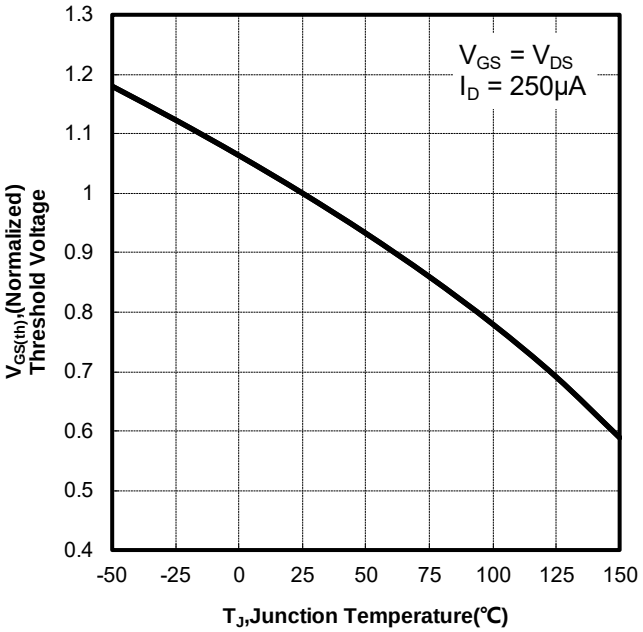

**Typ. transfer characteristics**
$I_D=f(V_{GS})$



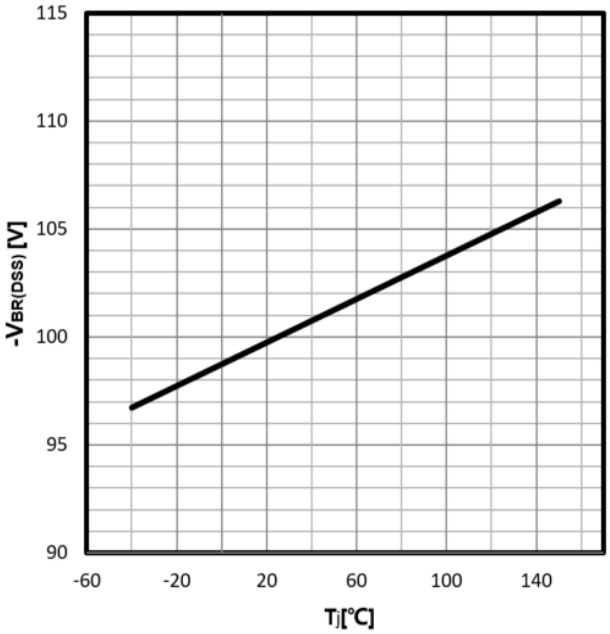

**Drain-source on-state resistance**
$R_{DS(on)}=f(T_j);I_D=-15A;\ V_{GS}=-10V$



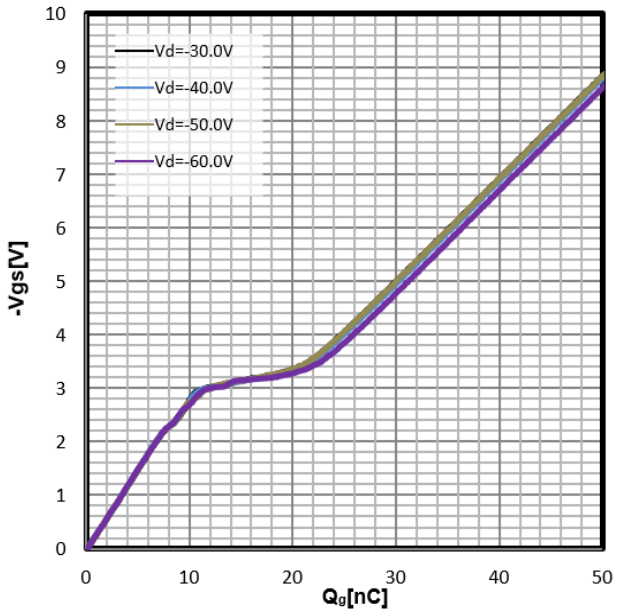
**Gate Threshold Voltage**
$-V_{TH}=f(T_j)$; $I_D$=-250uA



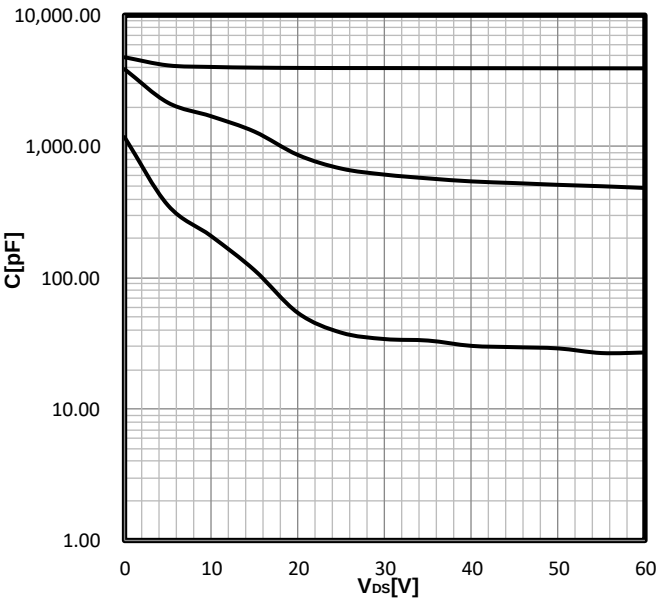

**Drain-source breakdown voltage**
$V_{BR(DSS)}=f(T_j)$; $I_D$=-250uA




**Typ. gate charge**
$V_{GS}=f(Q_{gate})$; $I_D$=-15A

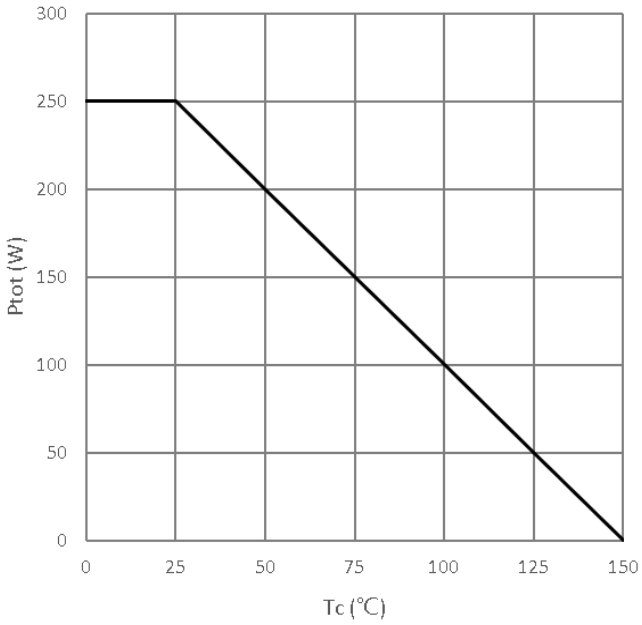



**Typ. capacitances**



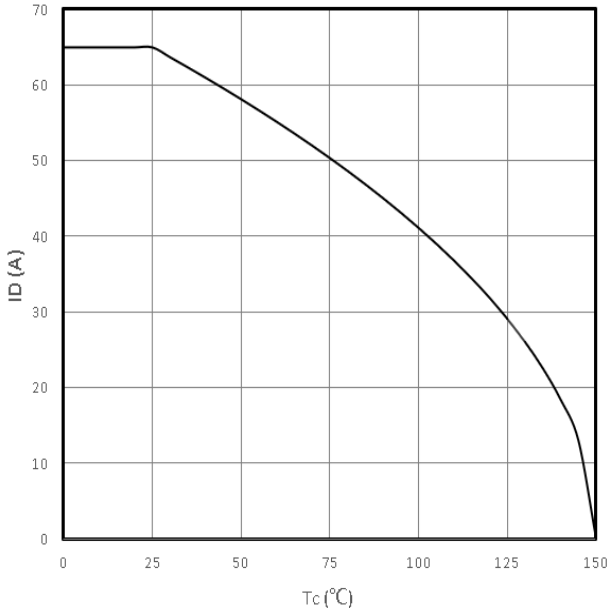
**Power Dissipation**

$P_{tot}=f(T_C)$



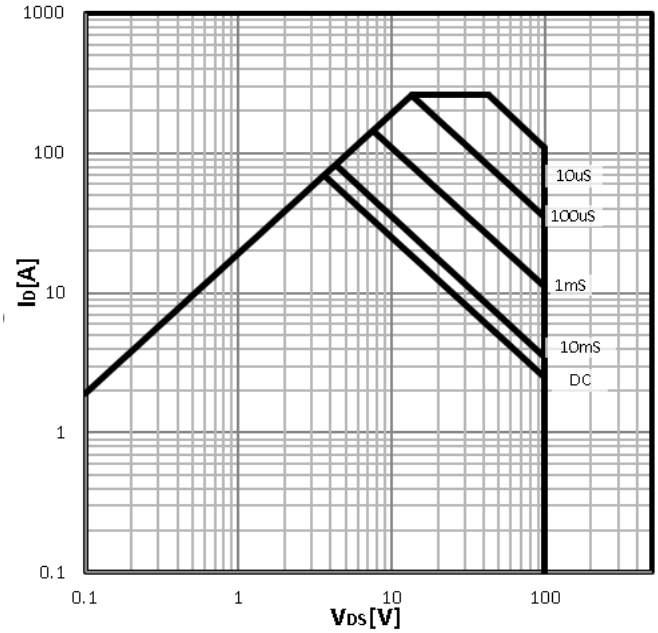

**Maximum Drain Current**

$-I_D=f(T_C)$



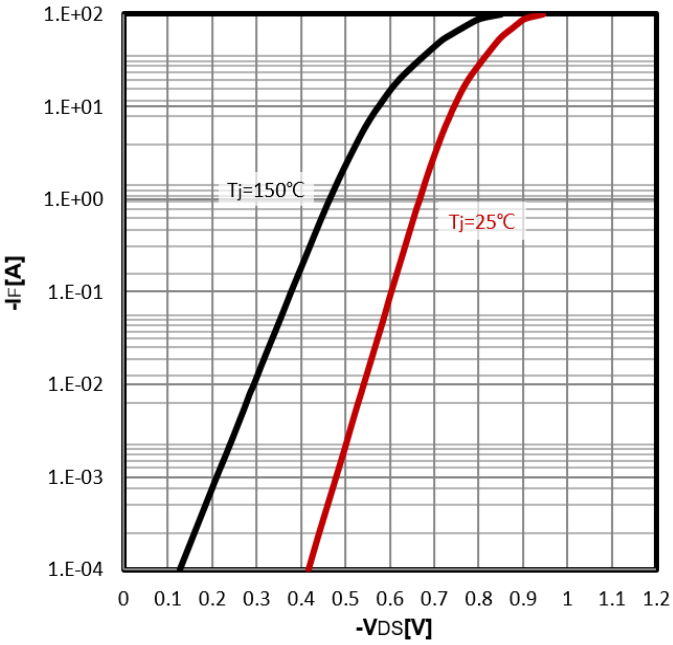

**Safe operating area**

$-I_D=f(-V_{DS})$



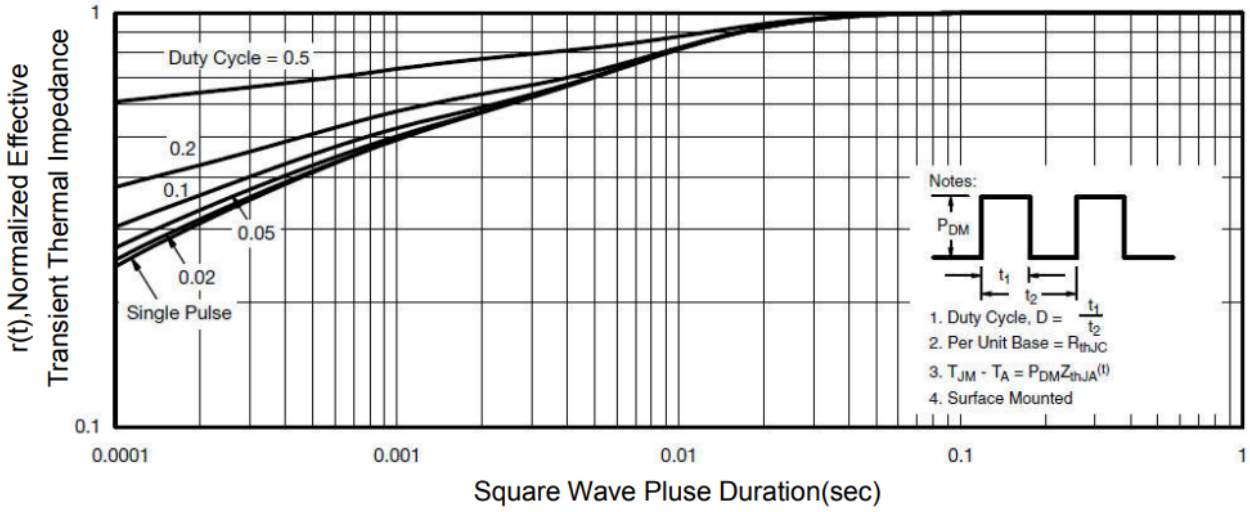

**Body Diode Forward Voltage Variation**

$-I_F=f(-V_{DS})$



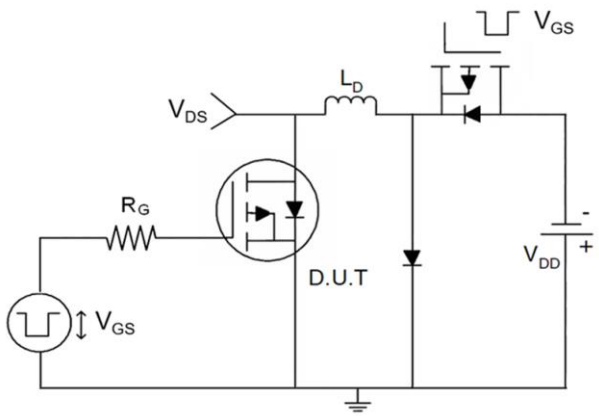
**Max. transient thermal impedance**

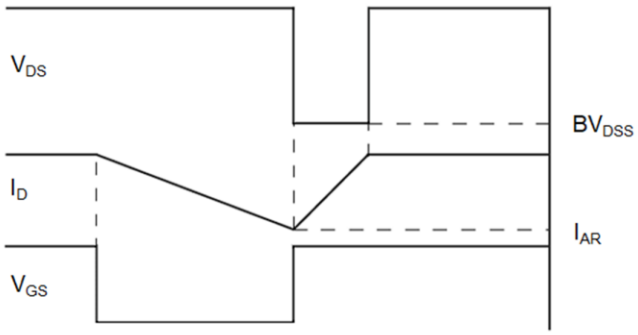
$Z_{thJC}=f(t_p)$



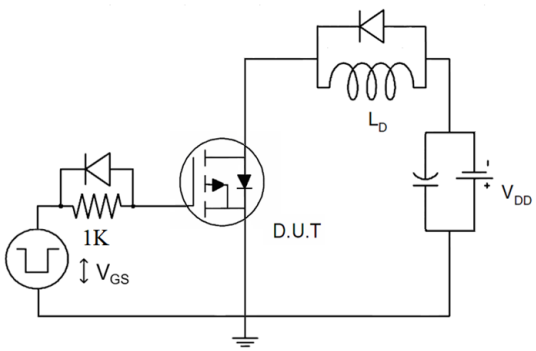
## Test Circuit

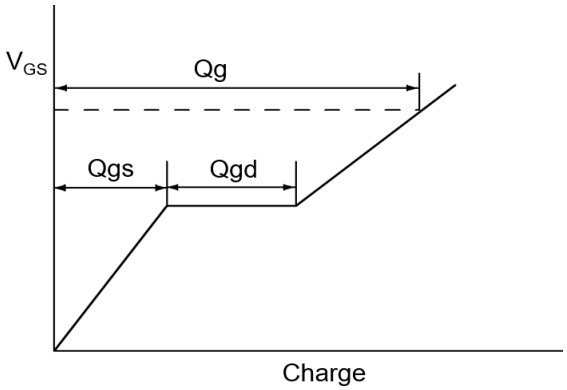
### 1) $E_{AS}$ Test Circuits



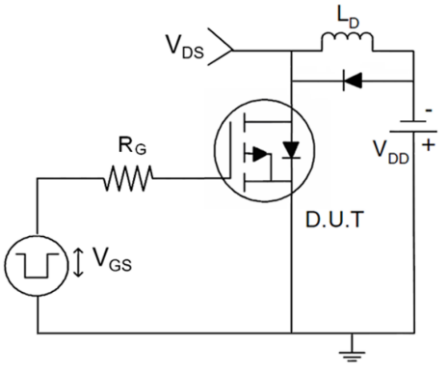



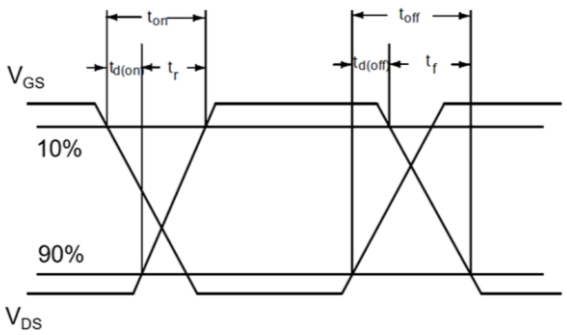

### 2) Gate Charge Test Circuit



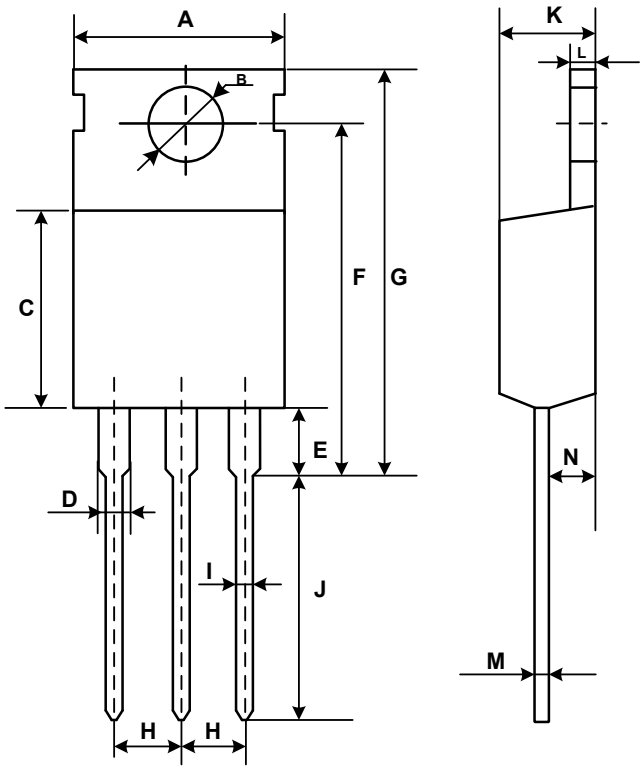




### 3) Switch Time Test Circuit



**Mechanical Dimensions for TO-220**




OMMON DIMENSIONS

| SYMBOL | MM | |
|---|---|---|
| | MIN | MAX |
| A | 9.70 | 10.30 |
| B | 3.40 | 3.80 |
| C | 8.80 | 9.40 |
| D | 1.17 | 1.47 |
| E | 2.60 | 3.50 |
| F | 15.10 | 16.70 |
| G | 19.55MAX | |
| H | 2.54REF | |
| I | 0.70 | 0.95 |
| J | 9.35 | 11.00 |
| K | 4.30 | 4.77 |
| L | 1.20 | 1.45 |
| M | 0.40 | 0.65 |
| N | 2.20 | 2.60 |