

MOSFET Silicon N-Channel MOS



1. Applications

Single-ended flyback or two-transistor forward topologies.
PC power, PD Adaptor, LCD & PDP TV and LED lighting.

2. Features

Low drain-source on-resistance: $R_{DS(ON)} = 620\text{m}\Omega$ (typ.)
Easy to control Gate switching
Enhancement mode: $V_{th} = 2.8$ to 4.2 V

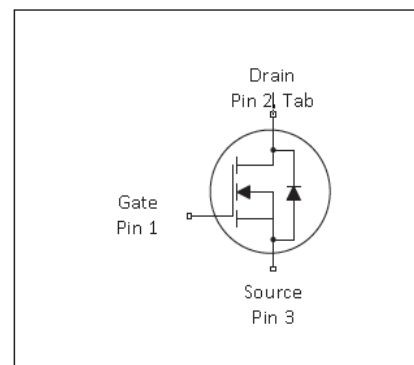
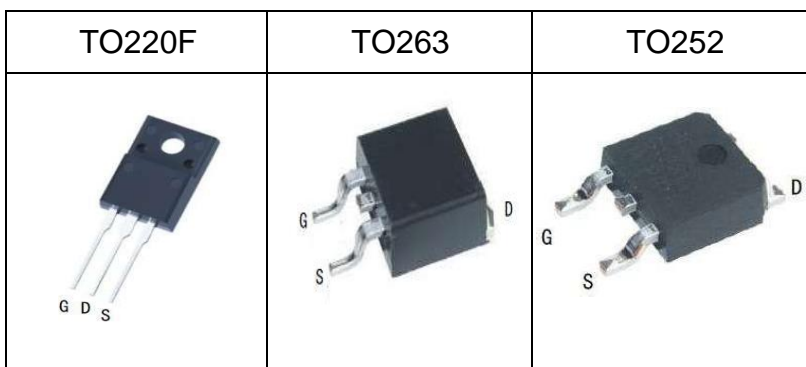


Table 1 Key Performance Parameters

| Parameter | Value | Unit |
|----------------------|-------|------------------|
| $V_{DS} @ T_{j,max}$ | 850 | V |
| $R_{DS(on),max}$ | 750 | $\text{m}\Omega$ |
| $Q_{g,typ}$ | 18.5 | nC |
| $I_{D,pulse}$ | 35 | A |
| Body diode dv/dt | 50 | V/ns |

3. Packaging and Internal Circuit

| Part Name | Package | Marking |
|------------|---------|------------|
| ASA80R750E | TO220F | ASA80R750E |
| ASD80R750E | TO252 | ASD80R750E |
| ASB80R750E | TO263 | ASB80R750E |



1 Maximum ratings

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 2 Maximum ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|---------------|--------|------|------|------------------|--|
| | | Min. | Typ. | Max. | | |
| Continuous drain current ¹⁾ | I_D | | - | 8.5 | A | $T_C=25^\circ\text{C}$ |
| Pulsed drain current ²⁾ | $I_{D,pulse}$ | - | - | 35 | A | $T_C=25^\circ\text{C}$ |
| Avalanche energy, single pulse | E_{AS} | - | - | 88 | mJ | $T_C=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $I_{av}=4.2\text{A}$, $L=10\text{mH}$, $R_G=25\Omega$ |
| Avalanche current, single pulse | I_{AR} | - | - | 4.2 | A | $T_C=25^\circ\text{C}$, $V_{DD}=50\text{V}$, $L=10\text{mH}$, $R_G=25\Omega$ |
| Gate source voltage (static) | V_{GS} | -30 | - | 30 | V | static; |
| Power dissipation (TO220F) | P_{tot} | - | - | 43 | W | $T_C=25^\circ\text{C}$ |
| Power dissipation (TO252&263) | P_{tot} | - | - | 150 | W | $T_C=25^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 | - | 150 | $^\circ\text{C}$ | |
| Operating junction temperature | T_j | -55 | - | 150 | $^\circ\text{C}$ | |
| Soldering Temperature Distance of 1.6mm from case for 10s | T_L | | | 260 | $^\circ\text{C}$ | |
| Reverse diode dv/dt ³⁾ | dv/dt | - | - | 4 | V/ns | $V_{DS}=0\dots400\text{V}$, $I_{SD}\leq 8\text{A}$, $T_j=25^\circ\text{C}$ see table 8 |

¹⁾ Limited by $T_{j,max}$. Maximum Duty Cycle $D = 0.50$

²⁾ Pulse width t_p limited by $T_{j,max}$

³⁾ Identical low side and high side switch with identical R_G

2 Thermal characteristics

Thermal characteristics(TO220F)

| Parameter | Symbol | Values | | | Unit | Note/Test Condition |
|---------------------------------------|------------|--------|------|------|------|----------------------------------|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction -case | R_{thJC} | - | - | 3.26 | °C/W | - |
| Thermal resistance, junction -ambient | R_{thJA} | - | - | 76 | °C/W | Device on PCB, minimal footprint |

Thermal characteristics (TO252&263)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|------------|--------|------|------|------|----------------------------------|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case | R_{thJC} | - | - | 1.1 | °C/W | - |
| Thermal resistance, junction - ambient | R_{thJA} | - | - | 62 | °C/W | device on PCB, minimal footprint |

3 Electrical characteristics

at $T_j=25^{\circ}\text{C}$, unless otherwise specified

Table 4 Static characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------------------|---------------|--------|------|------|------------|--|
| | | Min. | Typ. | Max. | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 800 | - | - | V | $V_{GS}=0V, I_D=250\mu A$ |
| Gate threshold voltage | $V_{(GS)th}$ | 2.8 | | 4.2 | V | $V_{DS}=V_{GS}, I_D=250\mu A$ |
| Zero gate voltage drain current | I_{DSS} | - | - | 1 | μA | $V_{DS}=800V, V_{GS}=0V, T_j=25^{\circ}\text{C}$ |
| Gate-source leakage current | I_{GSS} | - | - | 100 | nA | $V_{GS}=30V, V_{DS}=0V$ |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 620 | 750 | m Ω | $V_{GS}=10V, I_D=6A, T_j=25^{\circ}\text{C}$ |
| Gate resistance (Intrinsic) | R_G | - | 25 | - | Ω | $f=1\text{MHz}$, open drain |

Table 5 Dynamic characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|------------------------------|--------------|--------|-------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Input capacitance | C_{iss} | - | 850.8 | - | pF | $V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$ |
| Output capacitance | C_{oss} | - | 34.4 | - | pF | $V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$ |
| Reverse transfer capacitance | C_{rss} | - | 0.92 | - | pF | $V_{GS}=0V, V_{DS}=100V, f=1\text{MHz}$ |
| Turn-on delay time | $t_{d(on)}$ | - | 40.6 | - | ns | $V_{DD}=400V, V_{GS}=10V, I_D=4.1A, R_G=50\Omega$ |
| Rise time | t_r | - | 34.8 | - | ns | $V_{DD}=400V, V_{GS}=10V, I_D=4.1A, R_G=50\Omega$ |
| Turn-off delay time | $t_{d(off)}$ | - | 128 | - | ns | $V_{DD}=400V, V_{GS}=10V, I_D=4.1A, R_G=50\Omega$ |
| Fall time | t_f | - | 31 | - | ns | $V_{DD}=400V, V_{GS}=10V, I_D=4.1A, R_G=50\Omega$ |

Table 6 Gate charge characteristics

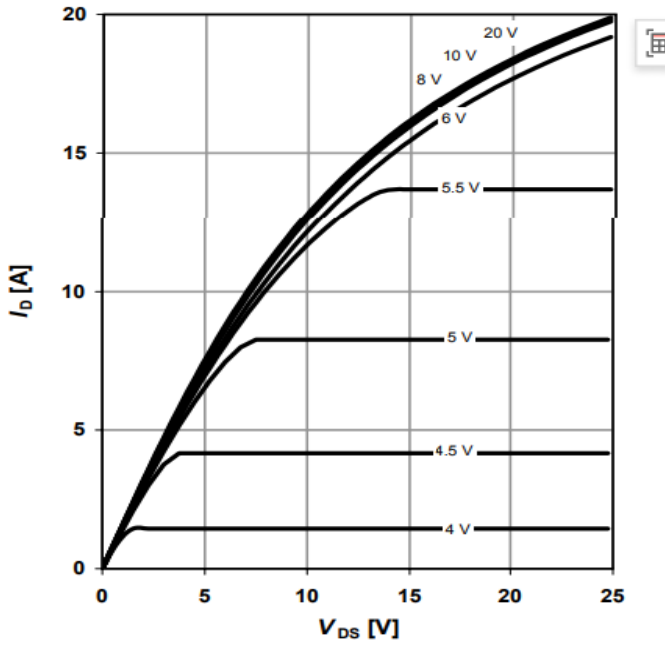
| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|-----------------------|----------|--------|------|------|------|--|
| | | Min. | Typ. | Max. | | |
| Gate to source charge | Q_{gs} | - | 5.0 | - | nC | $V_{DD}=400V, I_D=4.1A, V_{GS}=0$ to 10V |
| Gate to drain charge | Q_{gd} | - | 6.6 | - | nC | $V_{DD}=400V, I_D=4.1A, V_{GS}=0$ to 10V |
| Gate charge total | Q_g | - | 18.5 | - | nC | $V_{DD}=400V, I_D=4.1A, V_{GS}=0$ to 10V |

Table 7 Reverse diode characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|-------------------------------|-----------|--------|-------|------|---------|--|
| | | Min. | Typ. | Max. | | |
| Diode forward voltage | V_{SD} | - | 0.75 | - | V | $V_{GS}=0V, I_F=1A, T_J=25^{\circ}C$ |
| Reverse recovery time | t_{rr} | - | 266.5 | - | ns | $V_R=400V, I_F=4.1A, di_F/dt=100A/\mu s$ |
| Reverse recovery charge | Q_{rr} | - | 2.2 | - | μC | $V_R=400V, I_F=4.1A, di_F/dt=100A/\mu s$ |
| Peak reverse recovery current | I_{rrm} | - | 14 | - | A | $V_R=400V, I_F=4.1A, di_F/dt=100A/\mu s$ |

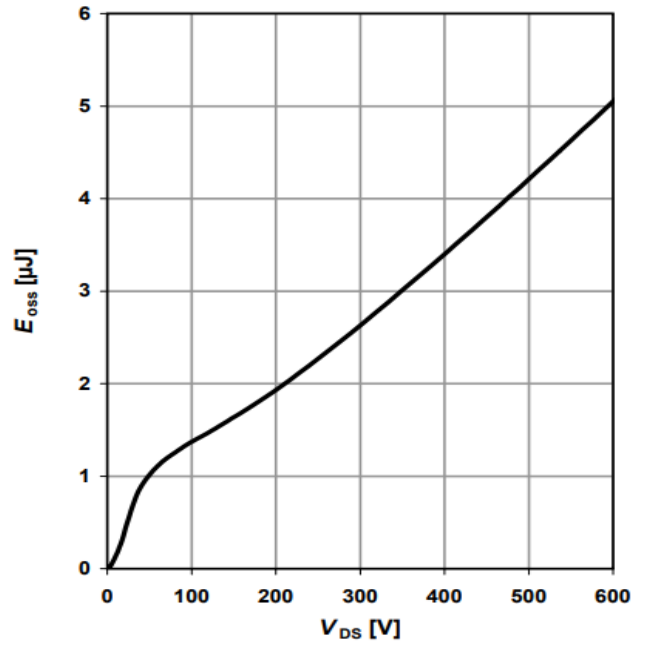
4 Electrical characteristics diagram

Diagram 1: Typ. output characteristics



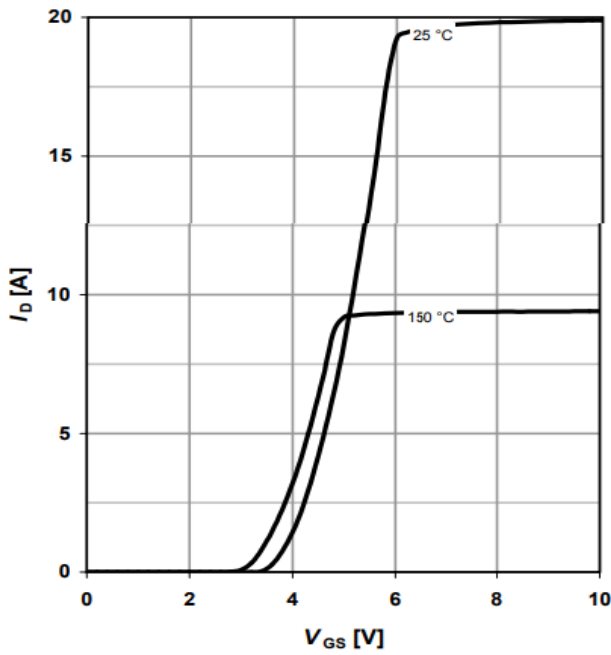
$I_D=f(V_{DS}); T_j=25\text{ }^\circ\text{C};$ parameter: V_{GS}

Diagram 2: Typ. Coss stored energy



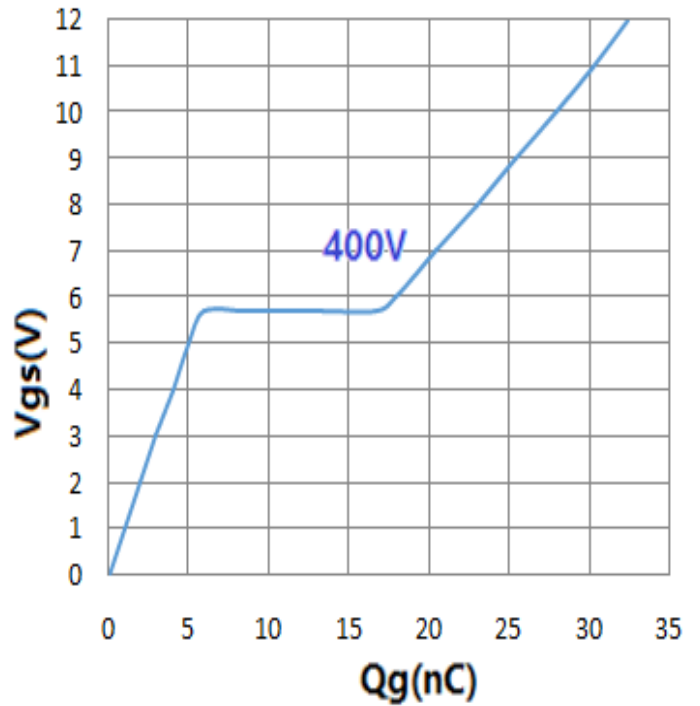
$E_{oss}=f(V_{DS})$

Diagram 3: Typ. transfer characteristics



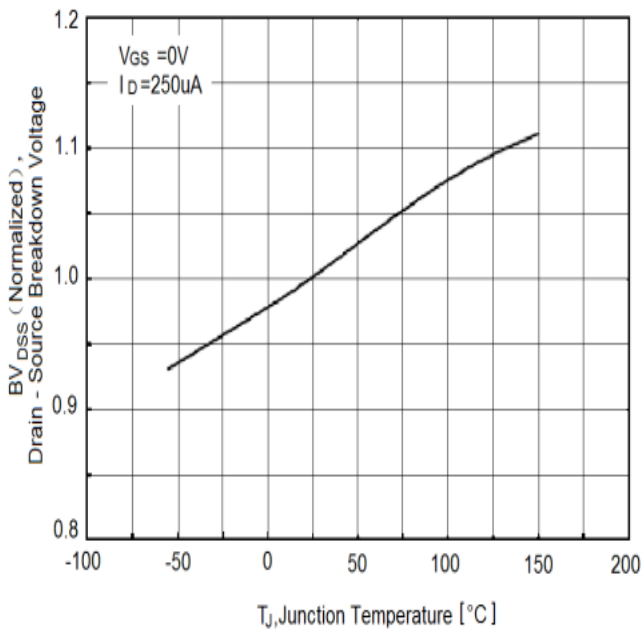
$I_D=f(V_{GS});$ parameter: T_j

Diagram 4: Typ. gate charge



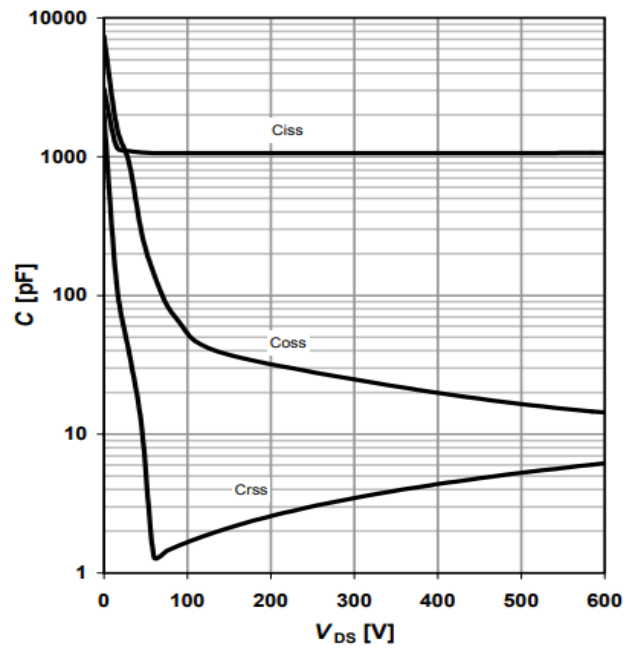
$V_{GS}=f(Q_{gate}); I_D=4.1\text{A pulsed};$ parameter: V_{DD}

Diagram 5: Drain-source breakdown voltage



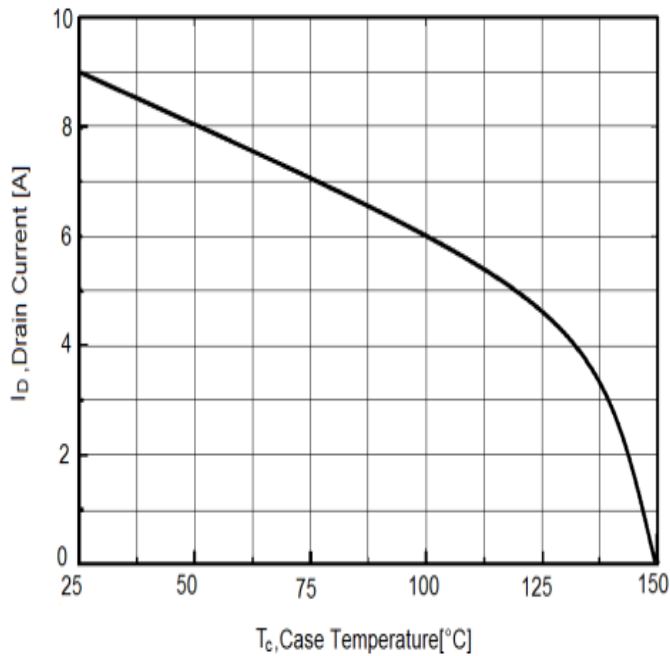
$V_{BR(DSS)} = f(T_j); I_D = 250\mu A$

Diagram 6: Typ. capacitances



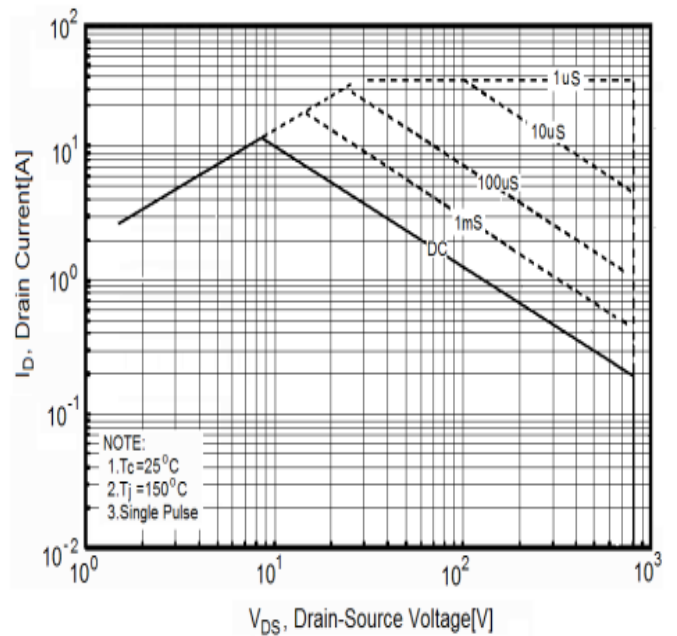
$C = f(V_{DS}); V_{GS} = 0V; f = 10 \text{ kHz}$

Diagram 7: Maximum I_D vs Junction Temperature



$V_{BR(DSS)} = f(T_j); I_D = 250\mu A$

Diagram 8: Safe Operating Area



$C = f(V_{DS}); V_{GS} = 0V; f = 10 \text{ kHz}$

5 Test Circuits

Table 8 Diode characteristics

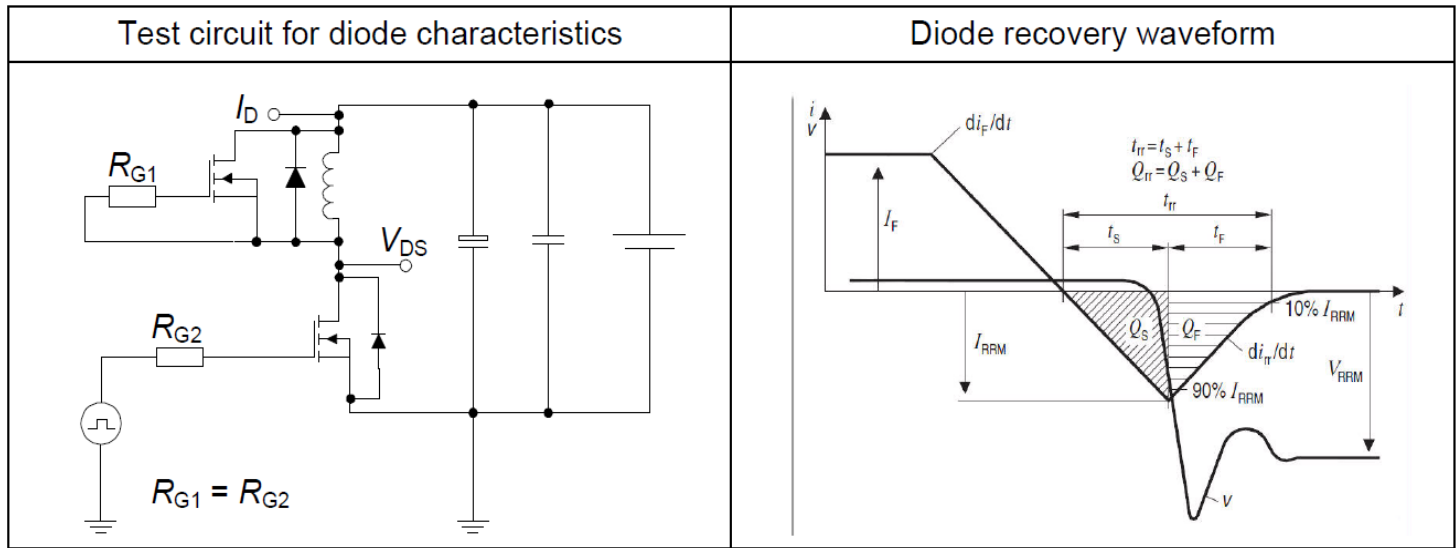


Table 9 Switching times

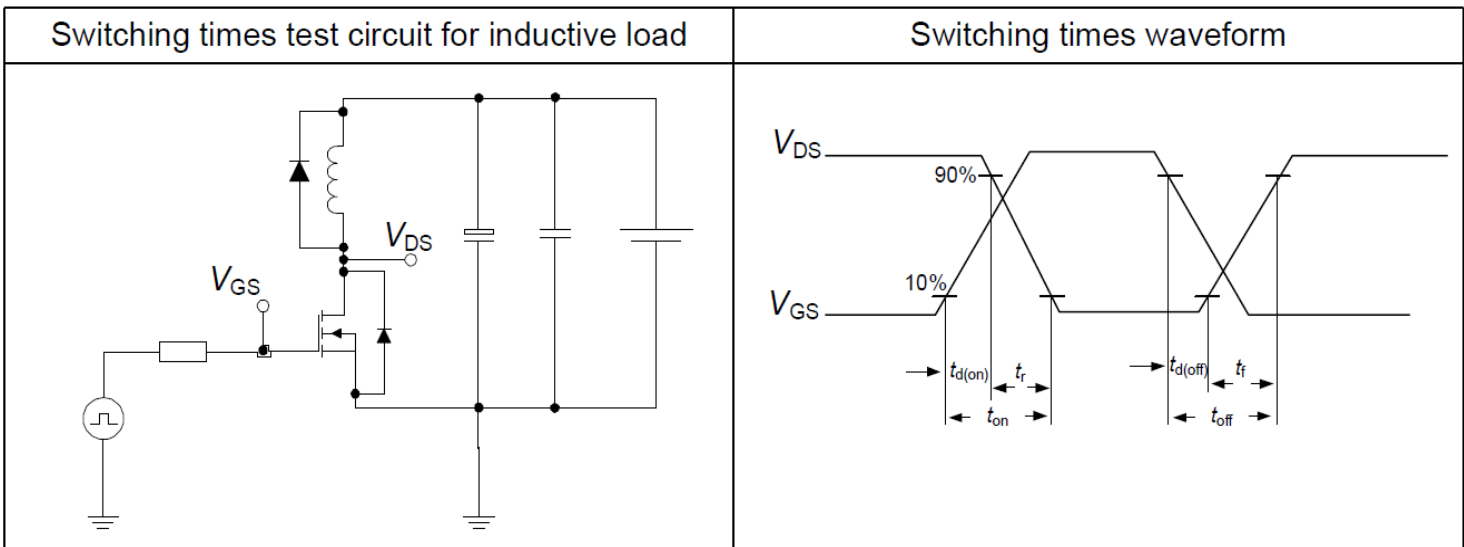
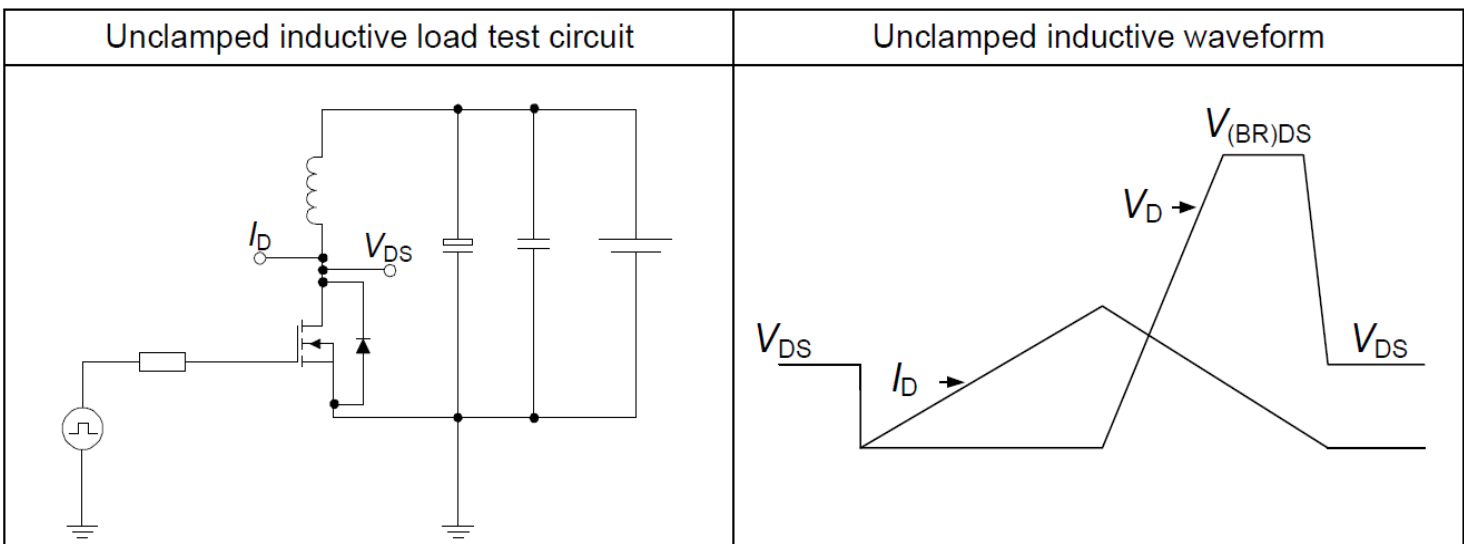
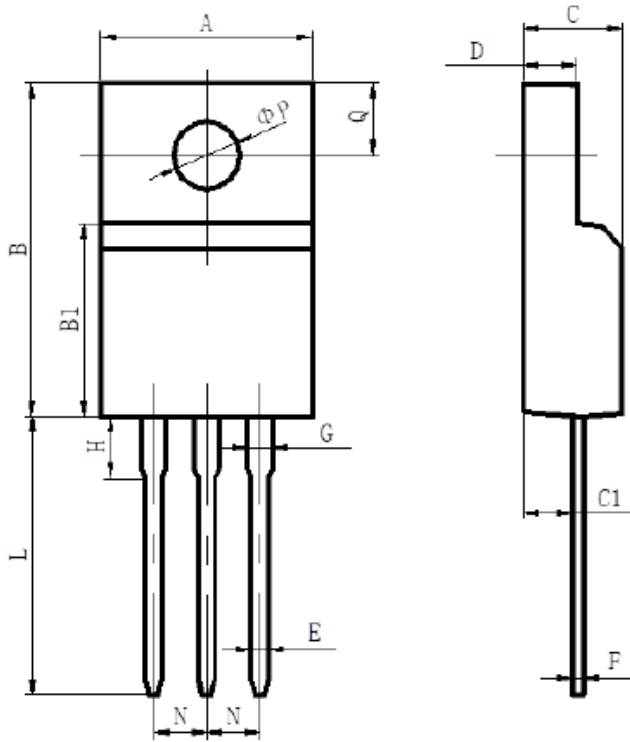


Table 10 Unclamped inductive load

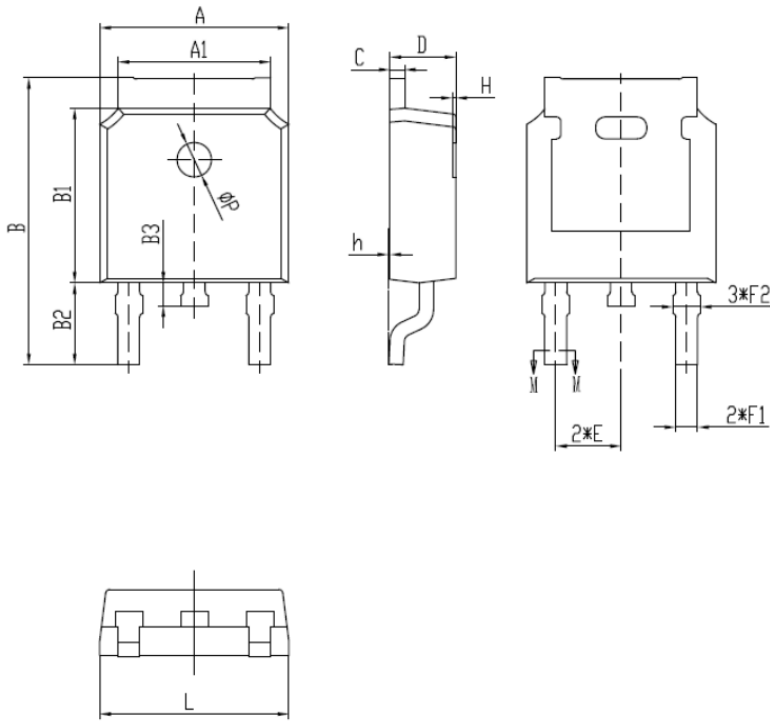


6 Package Outlines



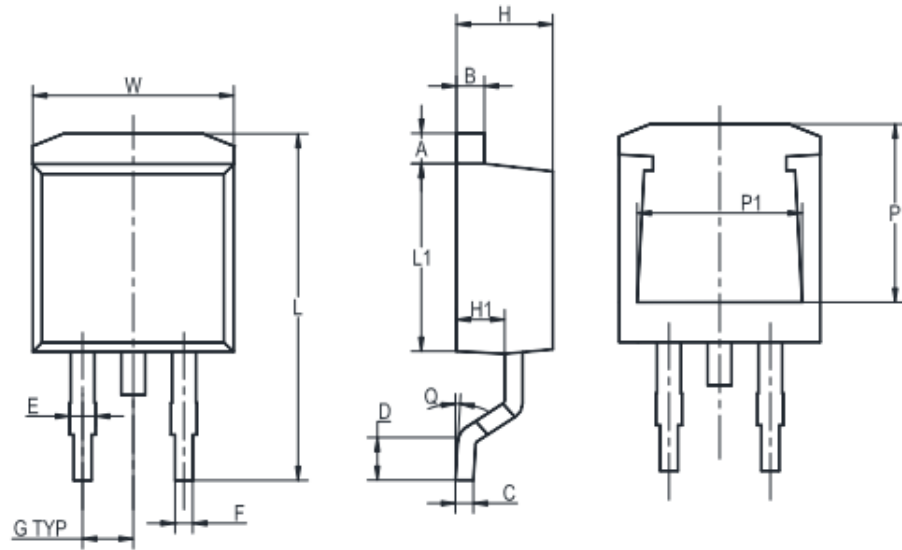
| 项目 | 规范(mm) | |
|----------|--------|-------|
| | MIN | MAX |
| A | 9.70 | 10.30 |
| B | 15.50 | 16.10 |
| B1 | 8.99 | 9.39 |
| C | 4.40 | 4.80 |
| C1 | 2.15 | 2.55 |
| D | 2.50 | 2.90 |
| E | 0.70 | 0.90 |
| F | 0.40 | 0.60 |
| G | 1.12 | 1.42 |
| H | 3.40 | 3.80 |
| L | 12.6 | 13.6 |
| N | 2.34 | 2.74 |
| Q | 3.15 | 3.55 |
| ϕP | 3.00 | 3.30 |

Figure 1: Outline PG-TO220F(HT)



| 项目 | 规范(mm) | |
|----------|--------|-------|
| | MIN | MAX |
| A | 6.50 | 6.70 |
| A1 | 5.16 | 5.46 |
| B | 9.77 | 10.17 |
| B1 | 6.00 | 6.20 |
| B2 | 2.60 | 3.00 |
| B3 | 0.70 | 0.90 |
| C | 0.45 | 0.61 |
| D | 2.20 | 2.40 |
| E | 2.186 | 2.386 |
| F1 | 0.67 | 0.87 |
| F2 | 0.76 | 0.96 |
| H | 0.00 | 0.30 |
| h | 0.00 | 0.127 |
| L | 6.50 | 6.70 |
| ϕP | 1.10 | 1.30 |

Figure 2: Outline PG-T0252(HT)



| UNIT | A | B | C | D | E | F | G | W | H | H1 | L | L1 | Q | P | P1 |
|------|-----|-----|-----|------|-----|------|------|------|-----|-----|------|-----|-----|-----|-----|
| mm | 1.5 | 1.5 | 0.5 | 2.60 | 1.6 | 0.94 | 2.54 | 10.5 | 4.8 | 2.9 | 16.5 | 8.7 | 8° | 7.6 | 8.2 |
| | 1.1 | 1.1 | 0.3 | 2.15 | 1.1 | 0.68 | TYP | 9.6 | 4.4 | 2.5 | 14.5 | 8.2 | MAX | 7.1 | 7.4 |

Figure 3: Outline PG-T0263(HC&LM)

Revision History

| Revision | Date | Subjects (major changes since last revision) |
|----------|------------|--|
| 1.0 | 2021-11-29 | Preliminary version |
| 1.1 | 2022-07-29 | Added TO252 package |
| 1.2 | 2023-06-02 | Added TO263 package |

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