

## 200V 18A Advanced N-Ch Power MOSFET

### FEATURES

- High Voltage :  $BV_{DSS}=200V(\text{Min.})$
- Low  $C_{rss}$  :  $C_{rss}=55pF(\text{Typ.})$
- Low gate charge :  $Q_g=22nC(\text{Typ.})$
- Low  $R_{DS(on)}$  :  $R_{DS(on)}=0.17\Omega(\text{Max.})$

### Marking Information

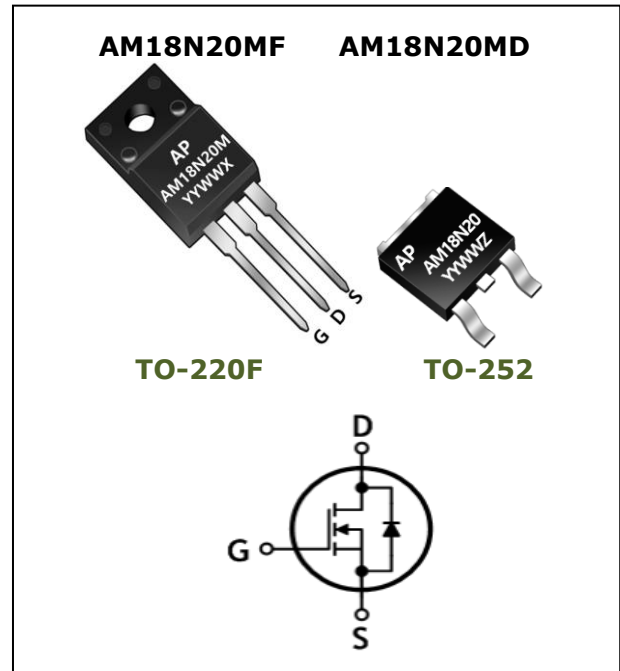
Row 1 : AP

Row 2 : Product Information

Row 3 : Date Code

- YY : Year Code
- WW : Week Code

### Ordering Information



| Part No   | Package | Packing         | Finish | Halogen | Packing Unit |
|-----------|---------|-----------------|--------|---------|--------------|
| AM18N20MF | TO-220F | Tube            | Sn     | Free    | 5,000EA      |
| AM18N20MD | TO-252  | 13" REEL & Tape | Sn     | Free    | 2,500EA      |

### Maximum Ratings (Tc=25 °C, unless otherwise noted)

| Characteristic                                         | Symbol           |                        | Rating  | Unit |
|--------------------------------------------------------|------------------|------------------------|---------|------|
| Drain-source voltage                                   | V <sub>DSS</sub> |                        | 200     | V    |
| Gate-source voltage                                    | V <sub>GSS</sub> |                        | ±30     | V    |
| Drain current (DC)*                                    | I <sub>D</sub>   | T <sub>C</sub> = 25°C  | 18      | A    |
|                                                        |                  | T <sub>C</sub> = 100°C | 9.1     |      |
| Drain current (Pulsed)*                                | I <sub>DM</sub>  |                        | 72      | A    |
| Power Dissipation                                      | P <sub>D</sub>   | TO-220F                | 50      | W    |
|                                                        |                  | TO-252                 | 48      |      |
| Avalanche current (Single) <small>(Note 2)</small>     | I <sub>AS</sub>  |                        | 18      | A    |
| Single pulsed avalanche energy <small>(Note 2)</small> | E <sub>AS</sub>  |                        | 453     | mJ   |
| Avalanche current (Repetitive) <small>(Note 1)</small> | I <sub>AR</sub>  |                        | 18      | A    |
| Repetitive avalanche energy <small>(Note 1)</small>    | E <sub>AR</sub>  |                        | 13.9    | mJ   |
| Junction temperature                                   | T <sub>J</sub>   |                        | 150     | °C   |
| Storage temperature range                              | T <sub>std</sub> |                        | -55~150 |      |

\*Limited only maximum junction temperature

REV. 02

## Thermal Characteristic (TO-220F)

| Characteristic                          | Symbol        | Rating    | Unit |
|-----------------------------------------|---------------|-----------|------|
| Thermal resistance, junction to case    | $R_{th(j-c)}$ | Max. 2.5  | °C/W |
| Thermal resistance, junction to ambient | $R_{th(j-a)}$ | Max. 62.5 |      |

## Electrical Characteristics ( $T_C=25\text{ }^{\circ}\text{C}$ , unless otherwise noted)

| Characteristic                        | Symbol       | Test Condition                                                         | Min. | Typ. | Max.      | Unit          |
|---------------------------------------|--------------|------------------------------------------------------------------------|------|------|-----------|---------------|
| Drain-source breakdown voltage        | $BV_{DSS}$   | $I_D = 250\mu\text{A}$ , $V_{GS} = 0$                                  | 200  | -    | -         | V             |
| Gate threshold voltage                | $V_{GS(th)}$ | $I_D = 250\mu\text{A}$ , $V_{DS} = V_{GS}$                             | 2    | -    | 4         | V             |
| Drain-source cut-off current          | $I_{DSS}$    | $V_{DS} = 200\text{V}$ , $V_{GS} = 0\text{V}$                          | -    | -    | 1         | $\mu\text{A}$ |
|                                       |              | $V_{DS} = 200\text{V}$ , $T_C=150^{\circ}\text{C}$                     | -    | -    | 100       |               |
| Gate leakage current                  | $I_{GSS}$    | $V_{DS} = 0\text{V}$ , $V_{GS} = \pm 30\text{V}$                       | -    | -    | $\pm 100$ | nA            |
| Drain-source on-resistance (Note 4)   | $R_{DS(ON)}$ | $V_{GS} = 10\text{V}$ , $I_D = 9.0\text{A}$                            | -    | 0.14 | 0.17      | $\Omega$      |
| Forward transfer conductance (Note 4) | $g_{fs}$     | $V_{DS} = 10\text{V}$ , $I_D = 9.0\text{A}$                            | -    | 10.5 | -         | S             |
| Input capacitance                     | $C_{iss}$    | $V_{DS} = 25\text{V}$ , $V_{GS} = 0\text{V}$ ,<br>$f = 1.0\text{MHz}$  | -    | 942  | 1240      | pF            |
| Output capacitance                    | $C_{oss}$    |                                                                        | -    | 227  | -         |               |
| Reverse transfer capacitance          | $C_{rss}$    |                                                                        | -    | 55   | -         |               |
| Turn-on delay time (Note 3,4)         | $T_{d(on)}$  | $V_{DS} = 125\text{V}$ , $I_D = 18\text{A}$ ,<br>$R_G = 25\Omega$      | -    | 15   | -         | ns            |
| Rise time (Note 3,4)                  | $T_r$        |                                                                        | -    | 130  | -         |               |
| Turn-off delay time (Note 3,4)        | $t_{d(off)}$ |                                                                        | -    | 135  | -         |               |
| Fall time (Note 3,4)                  | $t_f$        |                                                                        | -    | 105  | -         |               |
| Total gate charge (Note 3,4)          | $Q_g$        | $V_{DS} = 160\text{V}$ , $V_{GS} = 10\text{V}$ ,<br>$I_D = 18\text{A}$ | -    | 22   | 28        | nC            |
| Gate-source charge (Note 3,4)         | $Q_{gs}$     |                                                                        | -    | 6.6  | -         |               |
| Gate-drain charge (Note 3,4)          | $Q_g$        |                                                                        | -    | 7.2  | -         |               |

## Source-Drain Diode Ratings and Characteristics ( $T_C=25\text{ }^{\circ}\text{C}$ , unless otherwise noted)

| Characteristic                   | Symbol   | Test Condition                                                                   | Min. | Typ. | Max. | Unit          |
|----------------------------------|----------|----------------------------------------------------------------------------------|------|------|------|---------------|
| Source current (DC)              | $I_S$    | Integral reverse diode<br>in the MOSFET                                          | -    | -    | 18   | A             |
| Source current (Pulsed) (Note 1) | $I_{SM}$ |                                                                                  | -    | -    | 72   | A             |
| Forward voltage (Note 4)         | $V_{SD}$ | $V_{GS} = 0\text{V}$ , $I_S = 12\text{A}$                                        | -    | -    | 1.4  | V             |
| Reverse recovery time            | $t_{rr}$ | $I_S = 12\text{A}$ , $V_{GS} = 0\text{V}$<br>$dI_F/dt = 100\text{A}/\mu\text{s}$ | -    | 208  | -    | ns            |
| Reverse recovery charge          | $Q_{rr}$ |                                                                                  | -    | 1.63 | -    | $\mu\text{C}$ |

### Note :

1. Repetitive rating : Pulse width limited by maximum junction temperature.
2.  $L=2.1\text{mH}$ ,  $I_{AS}=18\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^{\circ}\text{C}$
3. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$
4. Essentially independent of operating temperature

REV. 02



## Typical Electrical Characteristic

Fig. 1  $I_D - V_{DS}$

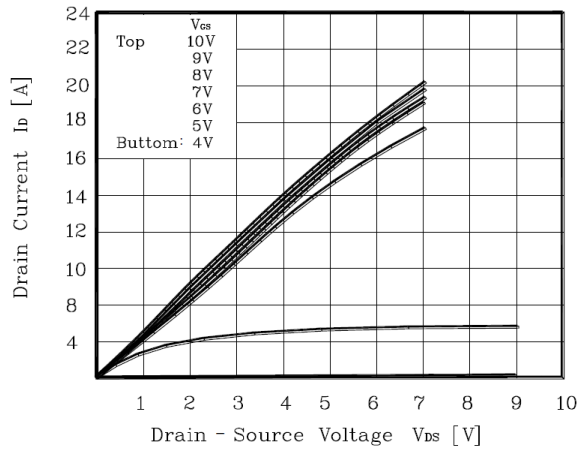


Fig. 2  $I_D - V_{GS}$

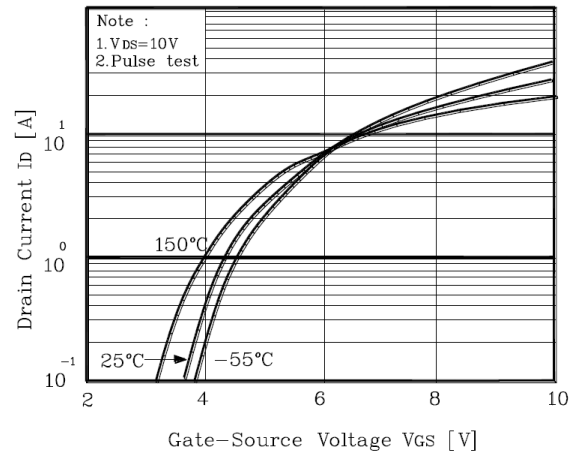


Fig. 3  $R_{DS(on)} - I_D$

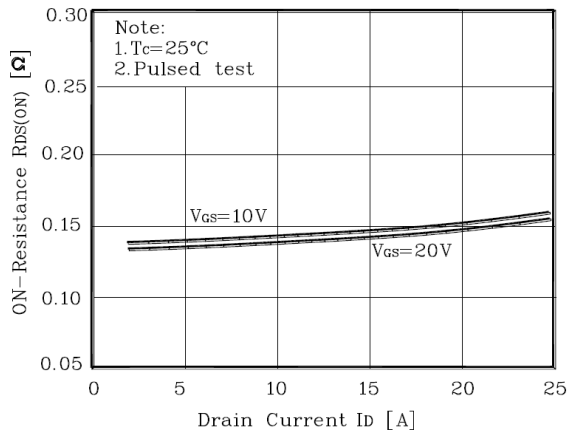


Fig. 4  $I_S - V_{SD}$

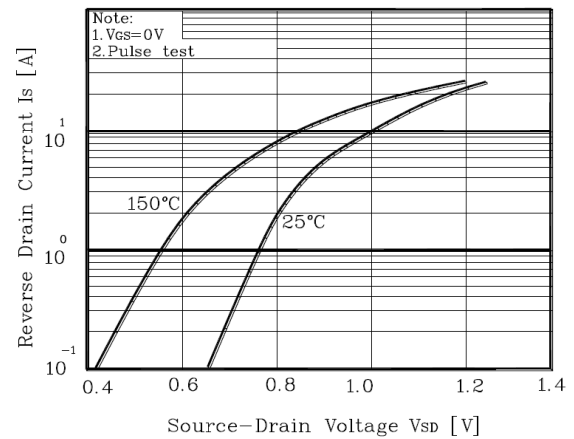


Fig. 5 Capacitance -  $V_{DS}$

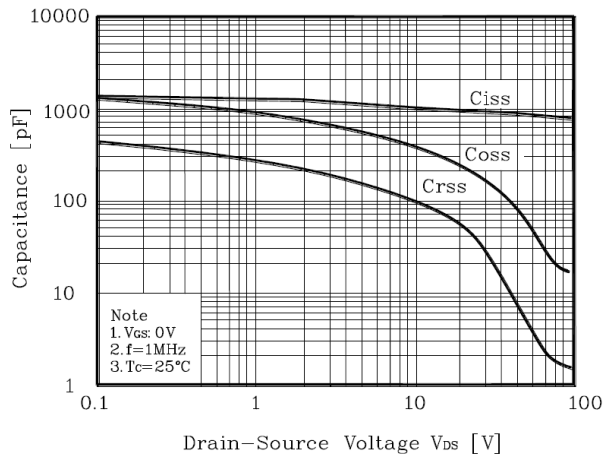
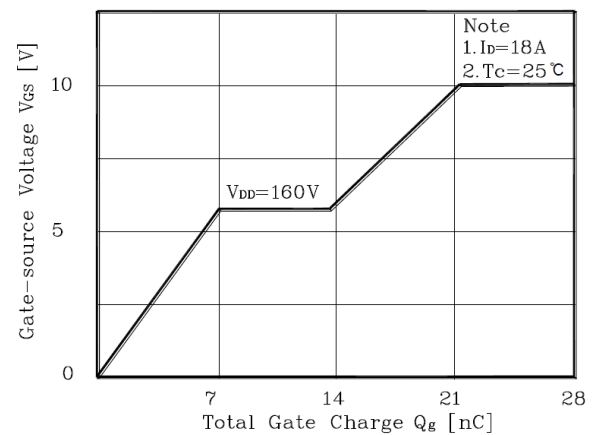


Fig. 6  $V_{GS} - Q_G$



## Typical Electrical Characteristic

Fig. 7  $V_{DS} - T_J$

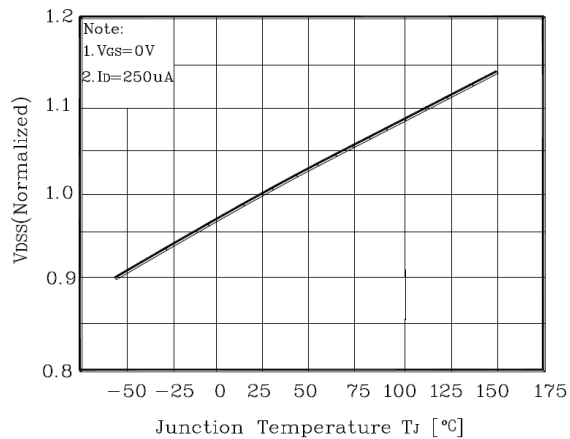


Fig. 8  $R_{DS(on)} - T_J$

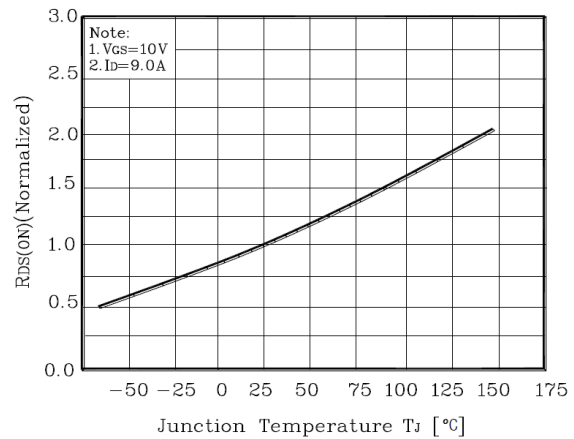


Fig. 9  $I_D - T_C$

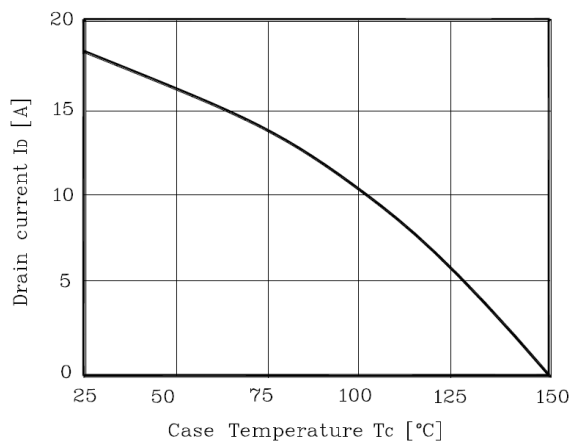
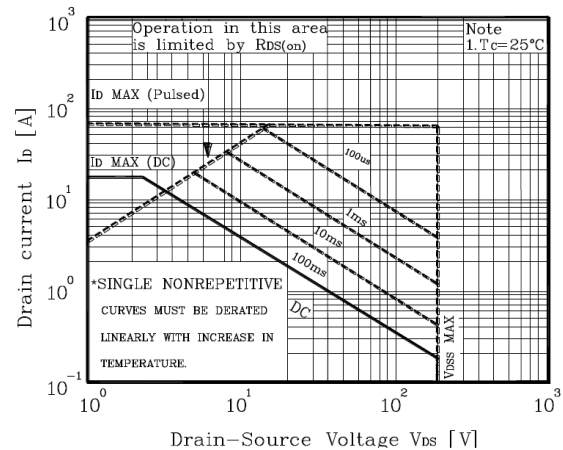
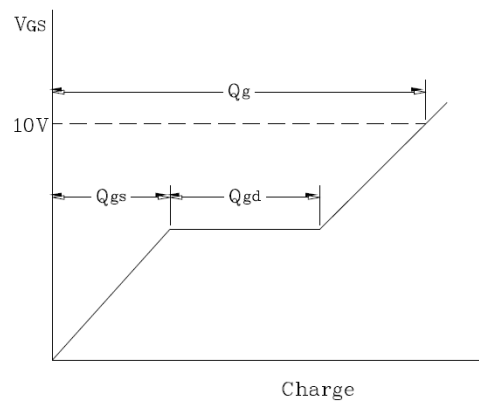
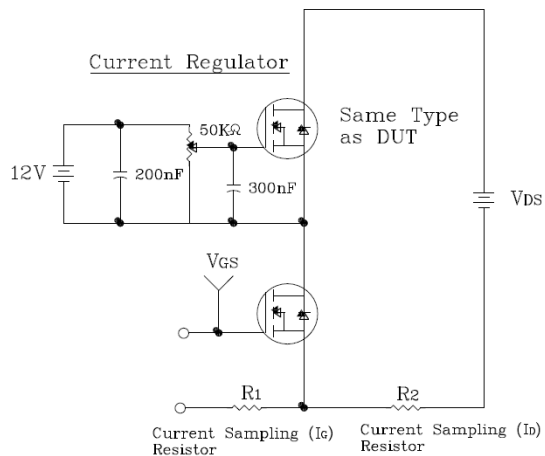


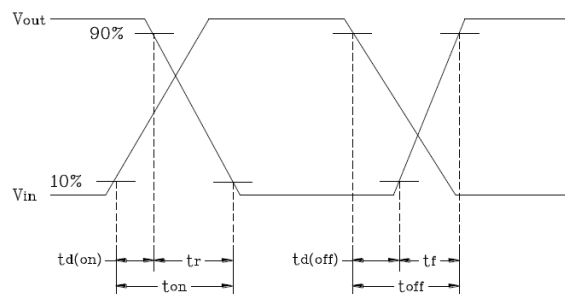
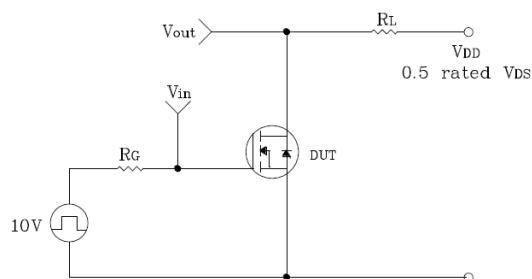
Fig. 10 Safe Operating Area



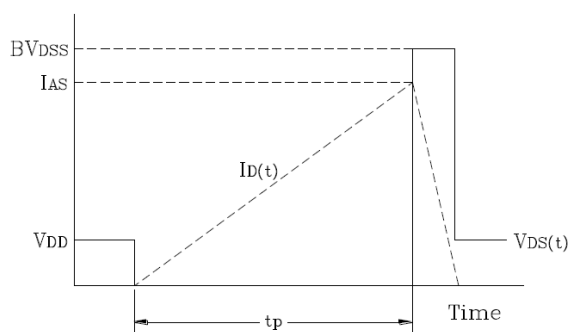
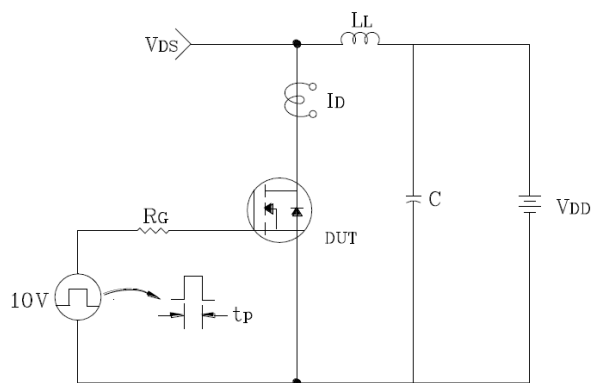
**Fig. 11 Gate Charge Test Circuit & Waveform**



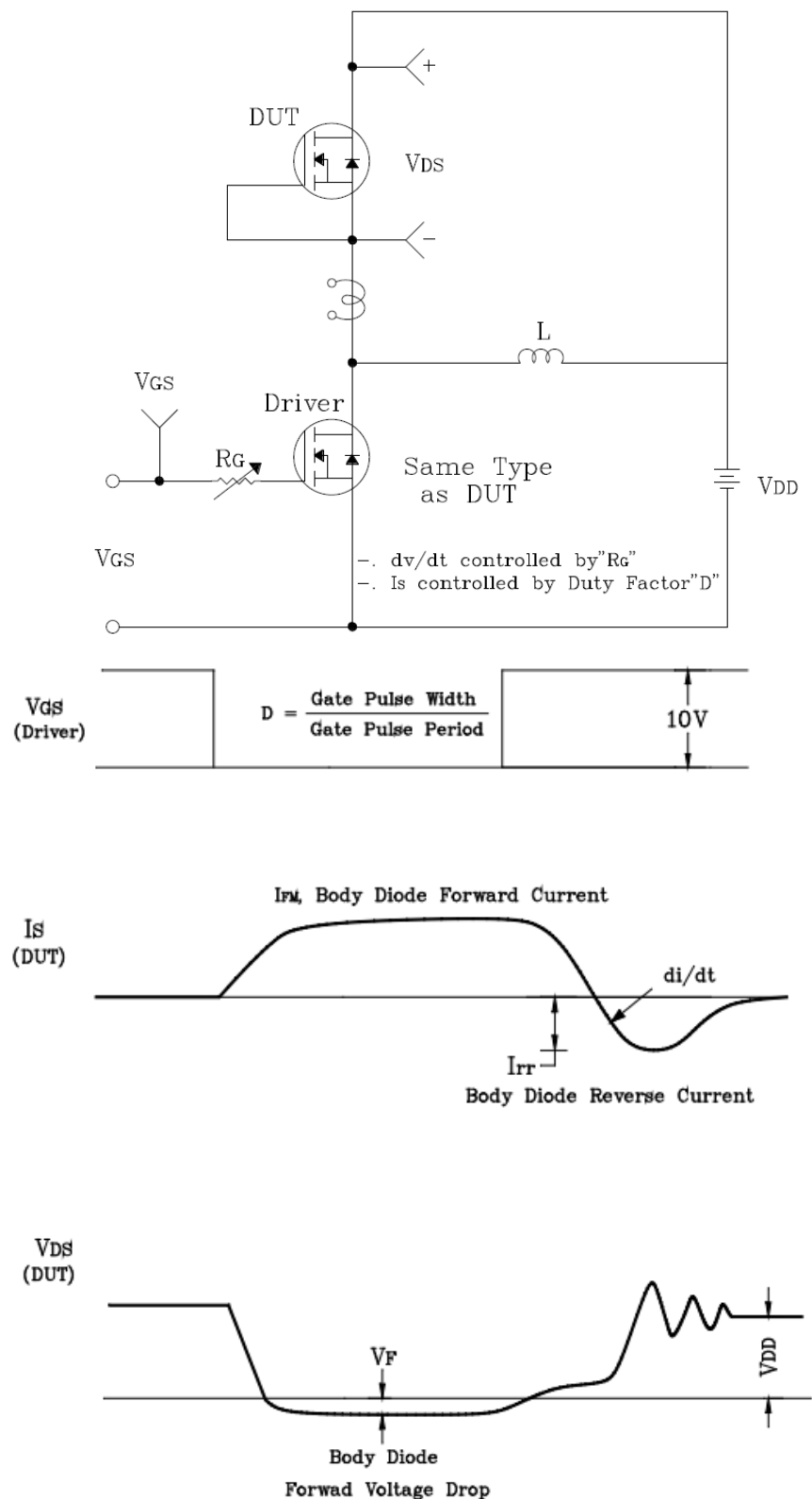
**Fig. 12 Resistive Switching Test Circuit & Waveform**



**Fig. 13 E<sub>AS</sub> Test Circuit & Waveform**



**Fig. 14 Diode Reverse Recovery Time Test Circuit & Waveform**

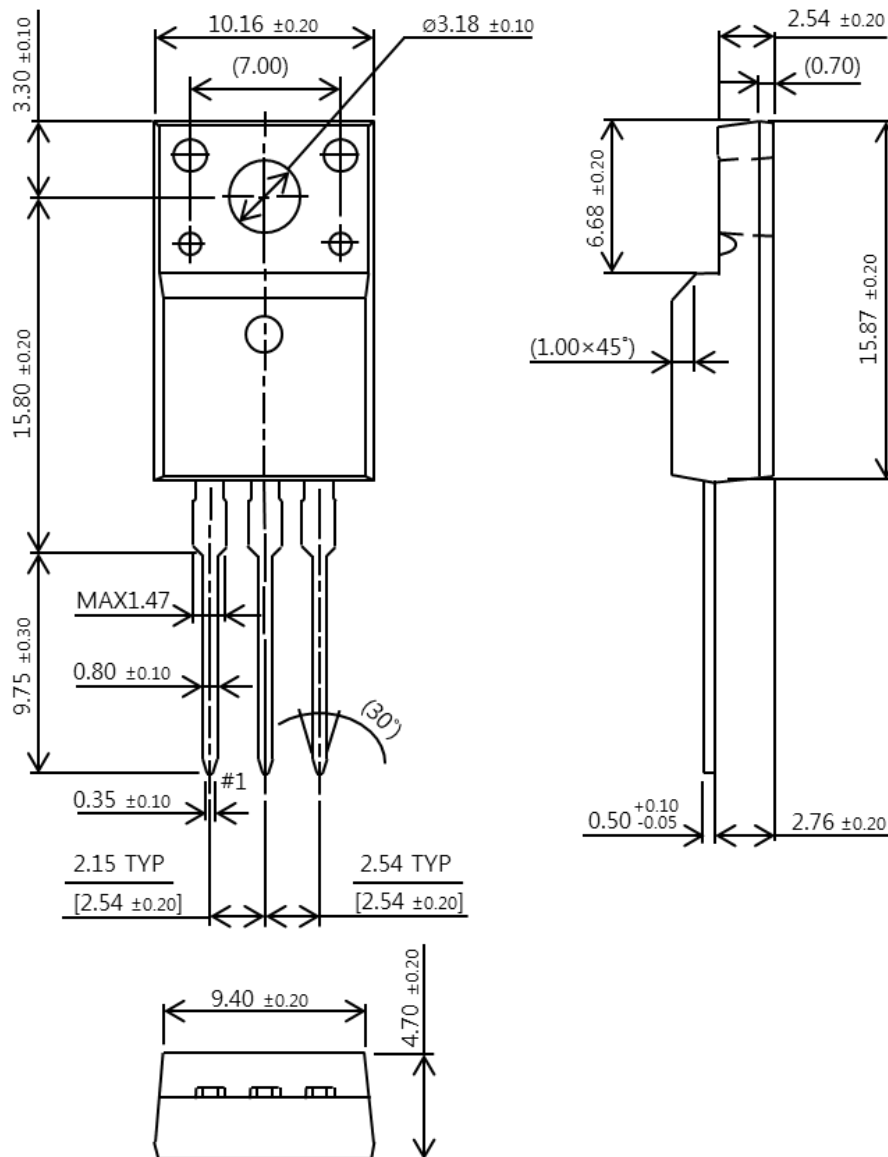


REV. 02



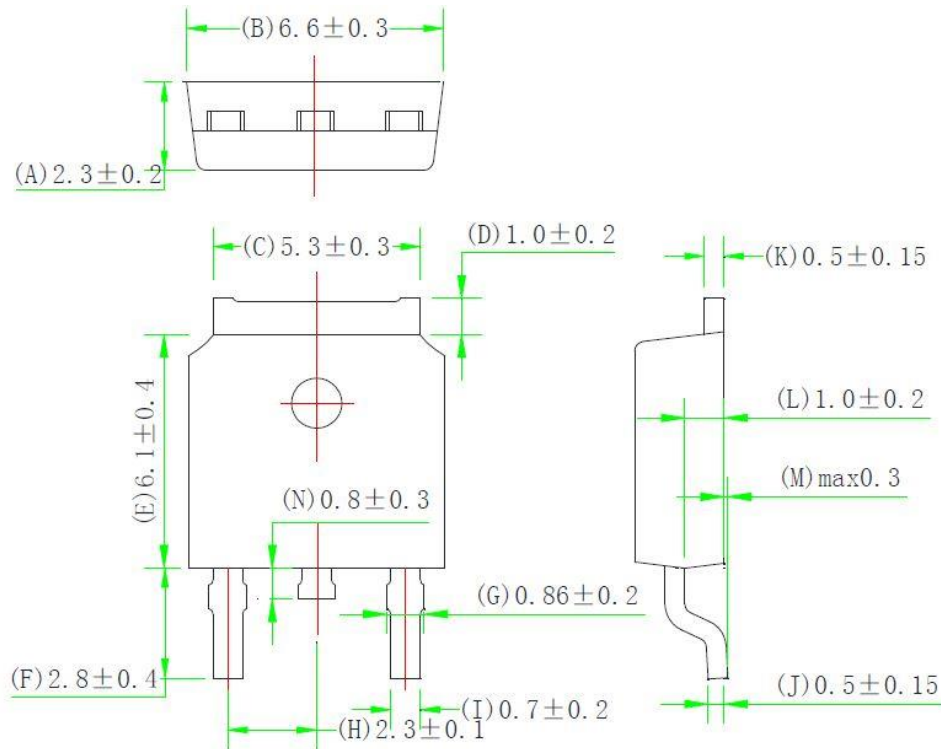
## Package Dimensions

TO-220F(unit : mm)





**TO-252**



## Revision History

| No | Date       | Contents                        |
|----|------------|---------------------------------|
| 0  | 2021-04-25 | Initial Brief Datasheet Release |
|    |            |                                 |
|    |            |                                 |

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