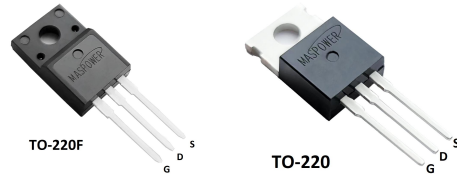


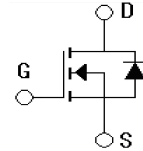
## Features

- $V_{DS}=1000V, I_D=10A$
- Low  $C_{rss}$
- Low gate charge
- Improved  $dv/dt$  capability



## Applications

- Switching applications



## Absolute Ratings ( $T_c=25^\circ\text{C}$ )

| Parameter                                                                   | Symbol         | Limit                   | Unit             |
|-----------------------------------------------------------------------------|----------------|-------------------------|------------------|
| Drain-Source Voltage                                                        | $V_{DSS}$      | 1000                    | V                |
| Transient Gate-Source Voltage                                               | $V_{GSM}$      | $\pm 30$                | V                |
| Continuous Gate-Source Voltage                                              | $V_{GSS}$      | $\pm 20$                | V                |
| Drain Current-continuous                                                    | $I_D$          | $T_c=25^\circ\text{C}$  | A                |
|                                                                             |                | $T_c=100^\circ\text{C}$ |                  |
| Drain Current-pulse <sup>(1)</sup>                                          | $I_{DM}$       | 40                      | A                |
| Max current during repetitive or single pulse avalanche <sup>(1)</sup>      | $I_{AR}$       | 6                       | A                |
| Single Pulsed Avalanche Energy <sup>(2)</sup>                               | $E_{AS}$       | 360                     | mJ               |
| Maximum Power Dissipation (TO-220F)                                         | $P_D$          | $T_c=25^\circ\text{C}$  | W                |
|                                                                             |                | $T_c=100^\circ\text{C}$ | W                |
| Maximum Power Dissipation (TO-220)                                          | $P_D$          | $T_c=25^\circ\text{C}$  | W                |
|                                                                             |                | $T_c=100^\circ\text{C}$ | W                |
| Operating and Storage Temperature Range                                     | $T_J, T_{STG}$ | -55~+150                | $^\circ\text{C}$ |
| Soldering temperature, wave soldering only allowed at leads.(1.6mm for 10s) | $T_L$          | 260                     |                  |

## Electrical Characteristics( $T_{CASE}=25^\circ\text{C}$ unless otherwise specified)

| Parameter                       | Symbol     | Tests conditions                                   | Min  | Type | Max | Units   |
|---------------------------------|------------|----------------------------------------------------|------|------|-----|---------|
| Drain-Source Breakdown Voltage  | $BV_{DSS}$ | $I_D=250\mu A, V_{GS}=0V$                          | 1000 | -    | -   | V       |
| Zero Gate Voltage Drain Current | $I_{DSS}$  | $V_{DS}=V_{DSS}, T_c=25^\circ\text{C}, V_{GS}=0V,$ | -    | -    | 1   | $\mu A$ |
|                                 |            | $T_c=125^\circ\text{C}$                            | -    | -    | 100 | $\mu A$ |

|                                                  |              |                                                    |   |      |           |          |
|--------------------------------------------------|--------------|----------------------------------------------------|---|------|-----------|----------|
| Gate-Body Leakage Current                        | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                        | - | -    | $\pm 100$ | nA       |
| <b>On-Characteristics</b>                        |              |                                                    |   |      |           |          |
| Gate Threshold Voltage                           | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                      | 3 | 4.1  | 5         | V        |
| Static Drain-Source On-Resistance <sup>(3)</sup> | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=3A$                               | - | 0.96 | 1.30      | $\Omega$ |
| Forward Transconductance <sup>(3)</sup>          | $g_{fs}$     | $V_{DS}=40V, I_D=3A$                               | - | 10   | -         | S        |
| <b>Dynamic Characteristics</b>                   |              |                                                    |   |      |           |          |
| Input capacitance                                | $C_{iss}$    | $V_{DS}=100V,$<br>$V_{GS}=0V,$<br>$f=1.0MHz^{(4)}$ | - | 440  | -         | pF       |
| Output capacitance                               | $C_{oss}$    |                                                    | - | 30   | -         | pF       |
| Reverse transfer capacitance                     | $C_{rss}$    |                                                    | - | 1.5  | -         | pF       |

**Electrical Characteristics**( $T_{CASE}=25^{\circ}C$  unless otherwise specified)

| Parameter                                                   | Symbol              | Tests conditions                                                                             | Min | Typ  | Max | Units |
|-------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------|-----|------|-----|-------|
| Switching-Characteristics                                   |                     |                                                                                              |     |      |     |       |
| Turn-On delay time                                          | t <sub>d(on)</sub>  | V <sub>DS</sub> =500V, I <sub>D</sub> =6A,<br>V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω      | -   | 15   | -   | ns    |
| Turn-On rise time                                           | t <sub>r</sub>      |                                                                                              | -   | 12   | -   | ns    |
| Turn-Off delay time                                         | t <sub>d(Off)</sub> |                                                                                              | -   | 31   | -   | ns    |
| Turn-Off rise time                                          | t <sub>f</sub>      |                                                                                              | -   | 20   | -   | ns    |
| Total Gate Charge                                           | Q <sub>g</sub>      | V <sub>DS</sub> =500V, I <sub>D</sub> =6A,<br>V <sub>GS</sub> =10V <sup>(4)</sup>            | -   | 15   | -   | nC    |
| Gate-Source charge                                          | Q <sub>gs</sub>     |                                                                                              | -   | 4    | -   | nC    |
| Gate-Drain charge                                           | Q <sub>gd</sub>     |                                                                                              | -   | 8    | -   | nC    |
| Drain-Source Diode Characteristics                          |                     |                                                                                              |     |      |     |       |
| Maximum Continuous<br>Drain-Source Diode<br>Forward Voltage | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =1A                                                      | -   | 0.76 | 1.2 | V     |
| Diode Forward Current                                       | I <sub>S</sub>      |                                                                                              | -   | -    | 10  | A     |
| Reverse recovery time                                       | T <sub>rr</sub>     | I <sub>S</sub> =6A, di <sub>F</sub> /dt=100A/μs<br>V <sub>R</sub> =100V, V <sub>GS</sub> =0V | -   | 332  | -   | ns    |
| Reverse recovery charge                                     | Q <sub>rr</sub>     |                                                                                              | -   | 3700 | -   | nC    |
| Reverse recovery current                                    | I <sub>rr</sub>     |                                                                                              | -   | 19   | -   | A     |

## Thermal Characteristics

| Parameter                                    | Symbol        | Value   |        | Unit                        |
|----------------------------------------------|---------------|---------|--------|-----------------------------|
|                                              |               | TO-220F | TO-220 |                             |
| Thermal Resistance, junction to Case, Max    | $R_{th(j-c)}$ | 3.4     | 0.68   | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance, junction to Ambient, Max | $R_{th(j-a)}$ | 63.5    | 52     | $^{\circ}\text{C}/\text{W}$ |

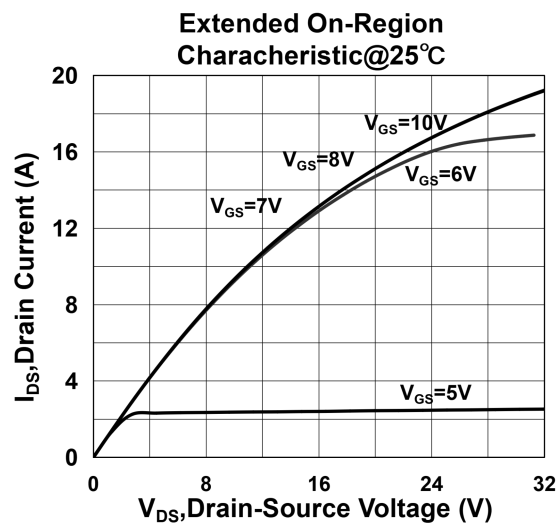
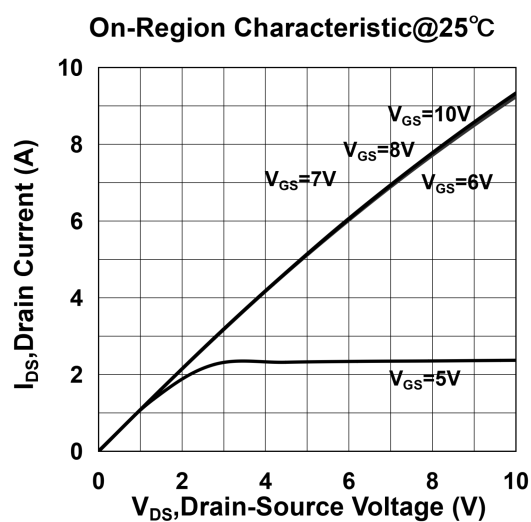
## Order Information

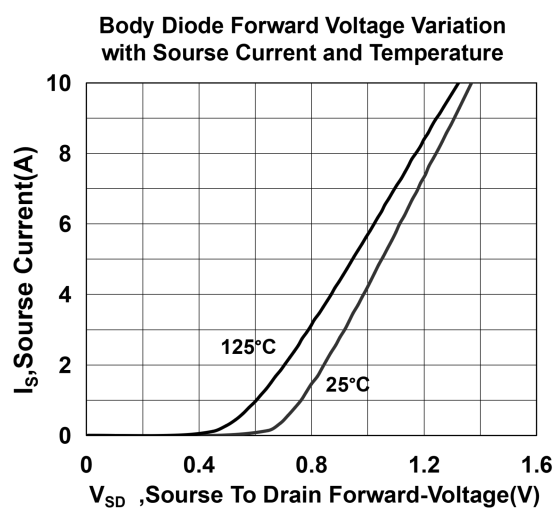
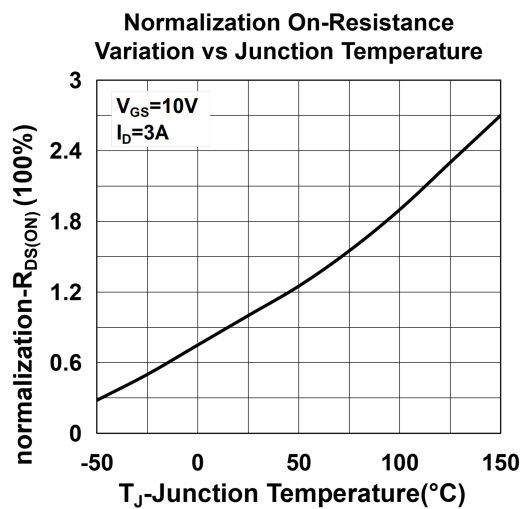
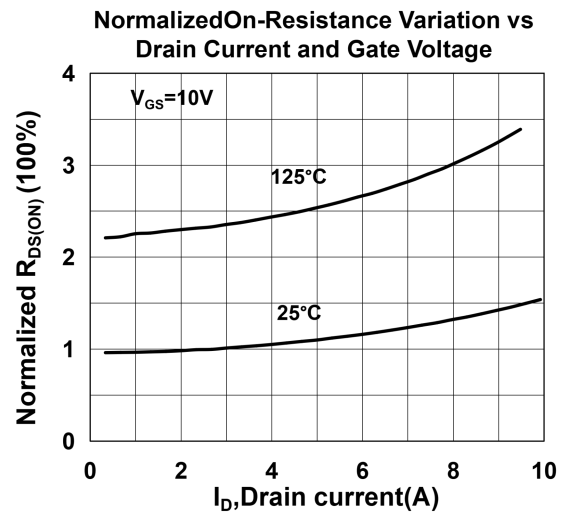
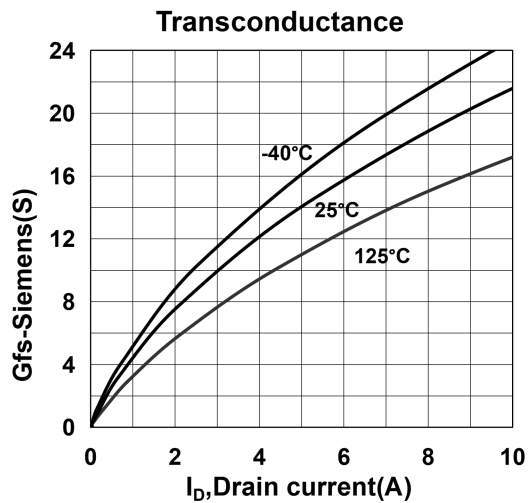
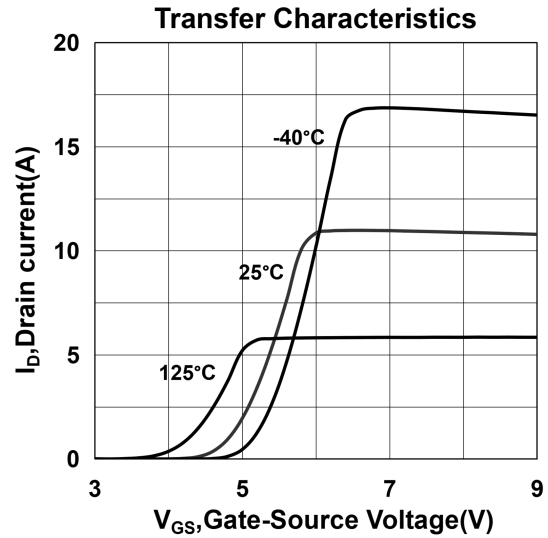
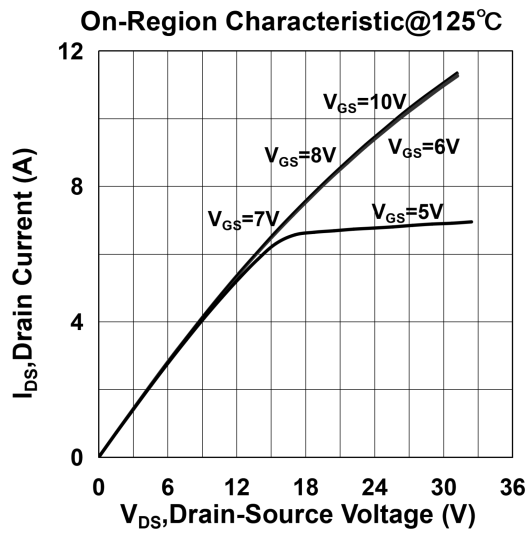
| Order codes  | Package | Packaging |
|--------------|---------|-----------|
| MS10N100HCT1 | T0-220F | Tube      |
| MS10N100HCT0 | T0-220  | Tube      |

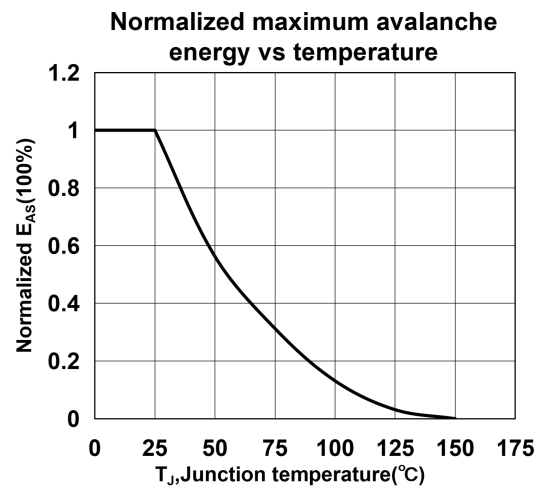
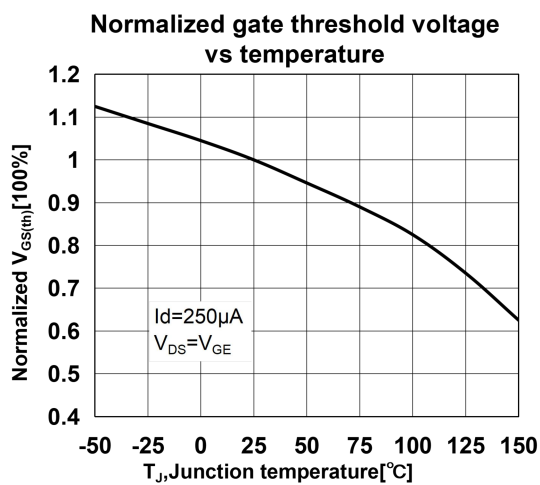
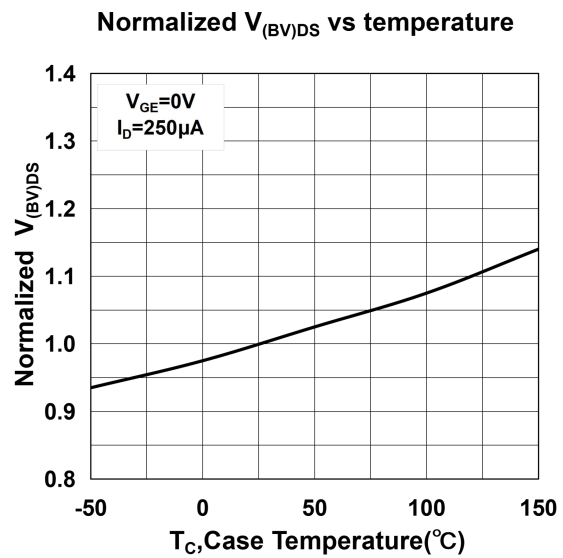
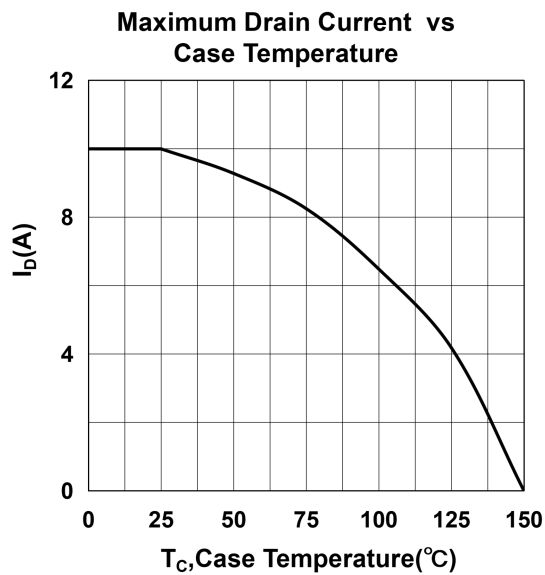
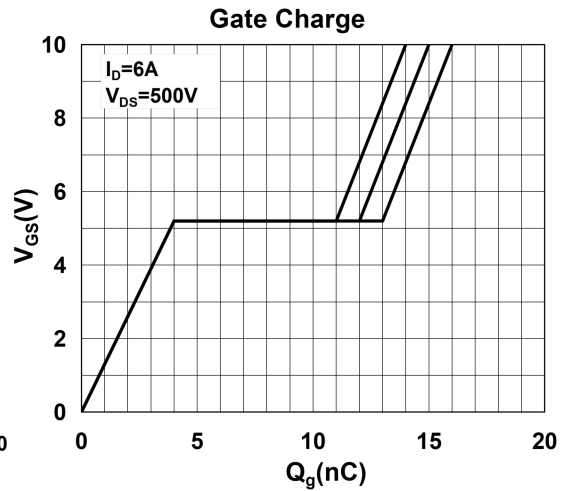
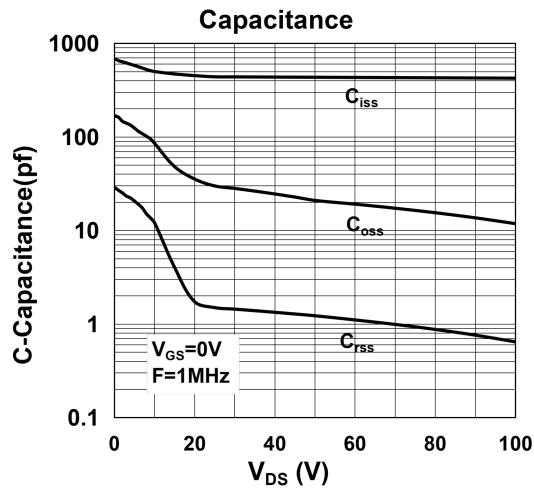
Notes:

- 1: Pulse width limited by maximum junction temperature
- 2:  $L=10\text{mH}$ ,  $I_{AS}=I_{AR}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , 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

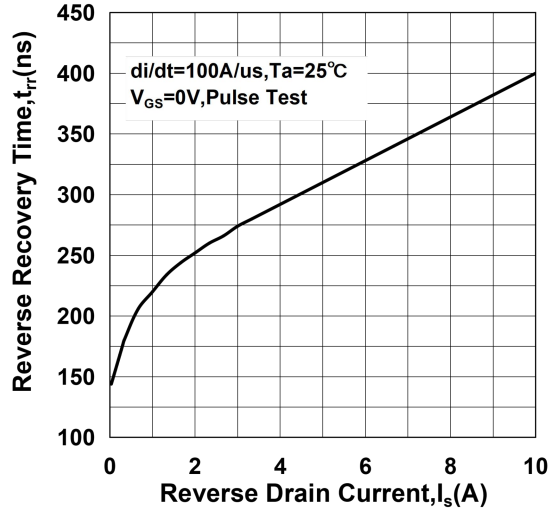
## Electrical Characteristics



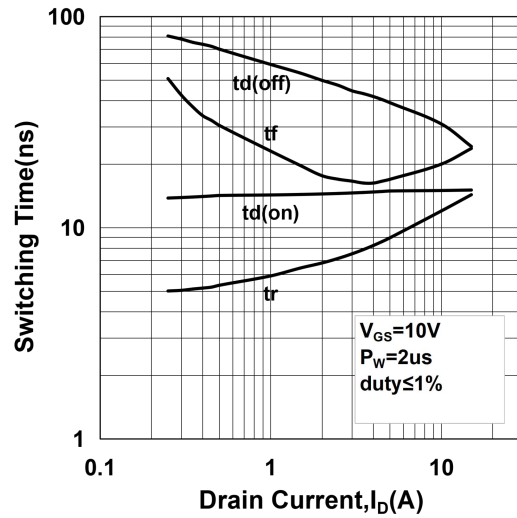




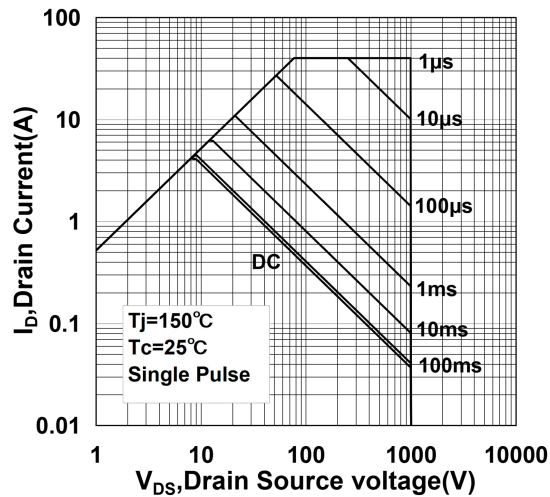
**Body Diode Reverse Recovery Time vs Source to Drain Current**



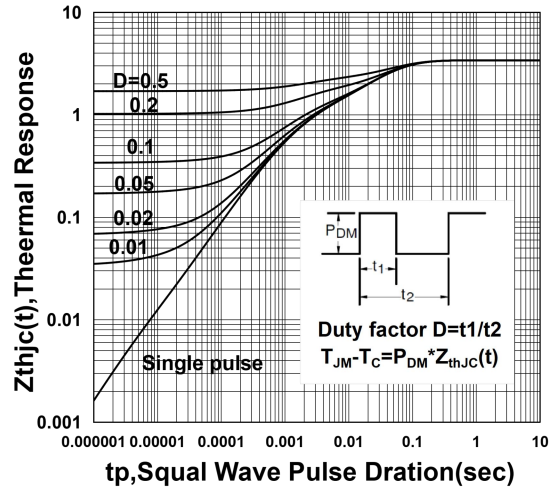
**Switching Characteristics**



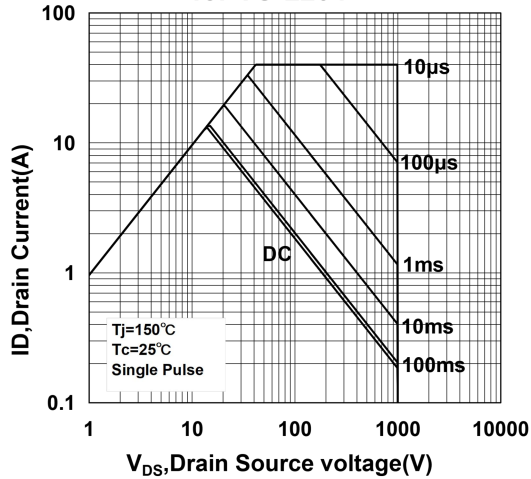
**Safe Operating Area for TO-220F**



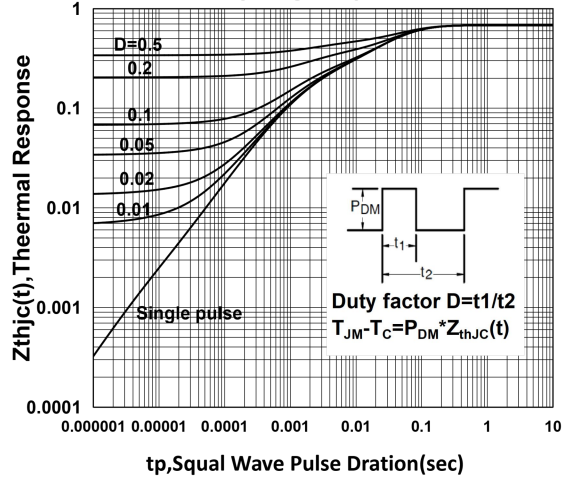
**Transient response Curve for TO-220F**



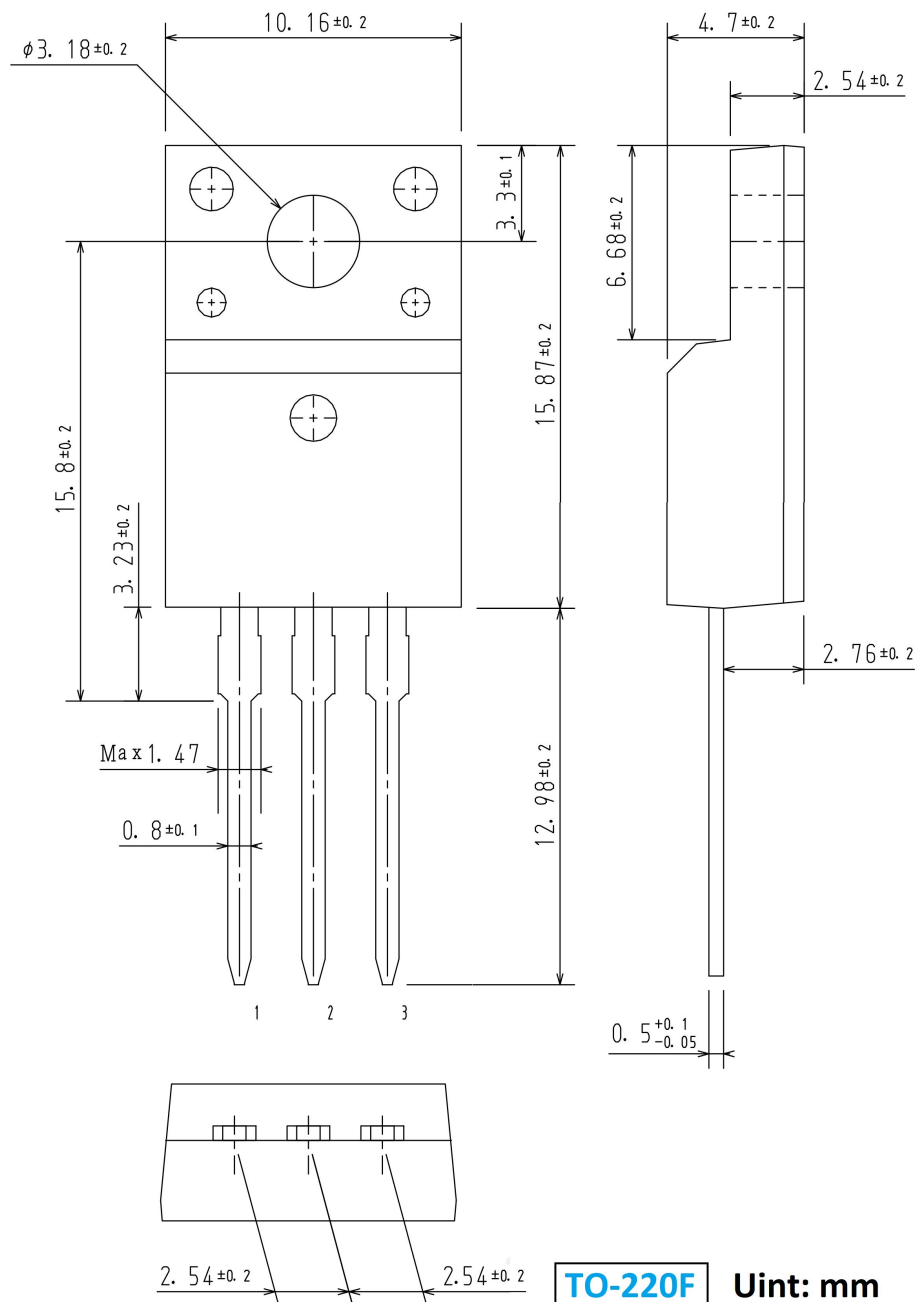
**Safe Operating Area for TO-220C**



**Transient response Curve for TO-220C**



### Package Mechanical Data



**TO-220F**

Unit: mm

