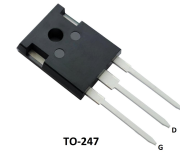
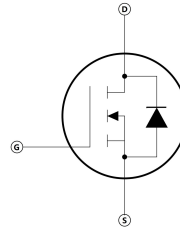


### Features

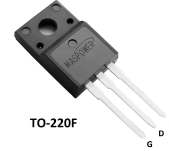
- Low gate charge
- Low Crss (typical 13pF )
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### Applications

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- LED power supplies



TO-247



TO-220F



TO-263



TO-220

### Absolute Ratings (Tc=25°C unless otherwise specified)

| Parameter                                       | Symbol                           |                      | Value    | Unit |
|-------------------------------------------------|----------------------------------|----------------------|----------|------|
| Drain-Source Voltage                            | V <sub>DSS</sub>                 |                      | 1000     | V    |
| Transient Gate-Source Voltage                   | V <sub>GSM</sub>                 |                      | ±30      | V    |
| Continuous Gate-Source Voltage                  | V <sub>GSS</sub>                 |                      | ±20      | V    |
| Drain Current -continuous                       | I <sub>D</sub>                   | T <sub>C</sub> =25℃  | 10       | A    |
|                                                 |                                  | T <sub>C</sub> =100℃ | 6.0*     | A    |
| Drain Current - pulse （note 1）                  | I <sub>DM</sub>                  |                      | 36       | A    |
| Single Pulsed Avalanche Energy<br>（note 2）      | E <sub>AS</sub>                  |                      | 858      | mJ   |
| Avalanche Current （note 1）                      | I <sub>AR</sub>                  |                      | 10       | A    |
| Repetitive Avalanche Current （note 1）           | E <sub>AR</sub>                  |                      | 27.7     | mJ   |
| Peak Diode Recovery dv/dt （note 3）              | dv/dt                            |                      | 4.1      | V/ns |
| Power Dissipation(TO-247/TO-263)                | P <sub>D</sub>                   |                      | 186.5    | W    |
| Power Dissipation(TO-220F)                      |                                  |                      | 67.9     | W    |
| Operating and Storage Temperature Range         | T <sub>J</sub> ,T <sub>STG</sub> |                      | -55~+150 | ℃    |
| Maximum Lead Temperature for Soldering Purposes | T <sub>L</sub>                   |                      | 300      | ℃    |

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

| Parameter                                              | Symbol                                  | Tests conditions                                                           | Min                                      | Typ  | Max  | Units |
|--------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------|------------------------------------------|------|------|-------|
| Off-Characteristics                                    |                                         |                                                                            |                                          |      |      |       |
| Drain-Source Voltage                                   | BV <sub>DSS</sub>                       | I <sub>D</sub> =250uA,V <sub>GS</sub> =0V                                  | 1000                                     | -    | -    | V     |
| Breakdown Voltage                                      | ΔBV <sub>DSS</sub> /<br>ΔT <sub>J</sub> | I <sub>D</sub> =250uA,referenced to 25°C                                   | -                                        | 0.98 | -    | V/°C  |
| Temperature Coefficient                                |                                         | V <sub>DS</sub> =900V,V <sub>GS</sub> =0V,T <sub>C</sub> =25°C             | -                                        | -    | 1    | uA    |
| Zero Gate Voltage Drain Current                        |                                         | V <sub>DS</sub> =720V,T <sub>C</sub> =125°C                                | -                                        | -    | 10   | uA    |
| Gate-body leakage current, forward                     |                                         | I <sub>GSSF</sub>                                                          | V <sub>DS</sub> =0V,V <sub>GS</sub> =20V | -    | -    | 100   |
| Gate-body leakage current,reverse                      | I <sub>GSSR</sub>                       | V <sub>DS</sub> =0V,V <sub>GS</sub> =20V                                   | -                                        | -    | -100 | nA    |
| On-Characteristics                                     |                                         |                                                                            |                                          |      |      |       |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub>                     | V <sub>DS</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250uA                    | 2.25                                     | 3.3  | 4.40 | V     |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub>                     | V <sub>GS</sub> =10V,I <sub>D</sub> =1A 25°C                               | -                                        | 1.45 | 1.95 | Ω     |
| Forward Transconductance                               | g <sub>fs</sub>                         | V <sub>DS</sub> =40V,I <sub>D</sub> =4.5A(note 4)                          | -                                        | 9.5  | -    | S     |
| Dynamic Characteristics                                |                                         |                                                                            |                                          |      |      |       |
| Gate resistance                                        | R <sub>g</sub>                          | F=1.0MHz open drain                                                        | 0.5                                      | -    | 3    | Ω     |
| Input capacitance                                      | C <sub>iss</sub>                        | V <sub>DS</sub> =25V,<br>V <sub>GS</sub> =0V,<br>F=1.0MHz                  | 1200                                     | 2150 | 2830 | pF    |
| Output capacitance                                     | C <sub>oss</sub>                        |                                                                            | 100                                      | 189  | 246  | pF    |
| Reverse transfer capacitance                           | C <sub>rss</sub>                        |                                                                            | 5                                        | 13   | 17   | pF    |
| Switching Characteristics                              |                                         |                                                                            |                                          |      |      |       |
| Turn-On delay time                                     | t <sub>d(on)</sub>                      | V <sub>DD</sub> =450V,I <sub>D</sub> =9A,<br>R <sub>G</sub> =25Ω(note 4,5) | -                                        | 53   | 121  | ns    |
| Turn-On rise time                                      | t <sub>r</sub>                          |                                                                            | -                                        | 116  | 235  | ns    |
| Turn-Off delay time                                    | t <sub>d(off)</sub>                     |                                                                            | -                                        | 97   | 199  | ns    |
| Turn-Off Fall time                                     | t <sub>f</sub>                          |                                                                            | -                                        | 69   | 171  | ns    |
| Total Gate Charge                                      | Q <sub>g</sub>                          | V <sub>DS</sub> =720V,I <sub>D</sub> =9A,<br>V <sub>GS</sub> =10V(note4,5) | -                                        | 43   | 56   | nC    |
| Gate-Source charge                                     | Q <sub>gs</sub>                         |                                                                            | -                                        | 15   | 40   | nC    |
| Gate-Drain charge                                      | Q <sub>gd</sub>                         |                                                                            | -                                        | 21   | 50   | nC    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                         |                                                                            |                                          |      |      |       |
| Continuous Drain -Source Diode Forward Current         | I <sub>S</sub>                          |                                                                            | -                                        | -    | 10   | A     |
| Pulsed Drain-Source                                    | I <sub>SM</sub>                         |                                                                            | -                                        | -    | 36   | A     |

|                                    |          |                                                   |   |      |      |    |
|------------------------------------|----------|---------------------------------------------------|---|------|------|----|
| Diode Forward Current              |          |                                                   |   |      |      |    |
| Drain-Source Diode Forward Voltage | $V_{SD}$ | $V_{GS}=0V, I_S=1A$                               | - | 0.72 | 1.2  | V  |
| Reverse recovery time              | $t_{rr}$ | $V_{GS}=0V, I_S=9A$<br>$di_F/dt=100A/us$ (note 4) | - | 539  | 1200 | ns |
| Reverse recovery charge            | $Q_{rr}$ |                                                   | - | 6.41 | 12   | uC |

### Thermal characteristics

| Parameter                                   | Symbol        | Value                 |         | Unit |
|---------------------------------------------|---------------|-----------------------|---------|------|
|                                             |               | TO-247/TO-263/TO-220C | TO-220F |      |
| Thermal Resistance, Junction to Case,Max    | $R_{th(j-c)}$ | 0.67                  | 1.84    | °C/W |
| Thermal Resistance, Junction to Ambient,Max | $R_{th(j-A)}$ | 40                    | 62.5    | °C/W |

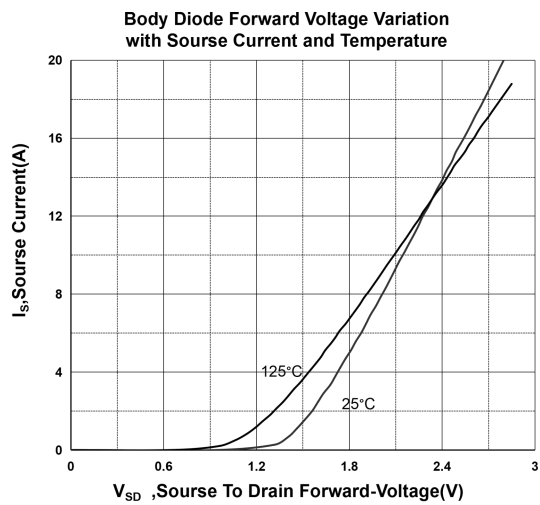
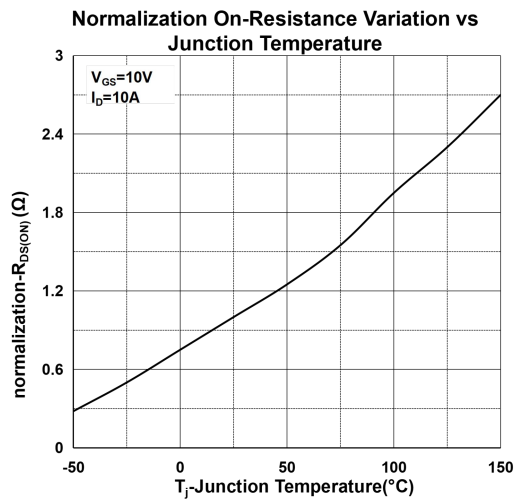
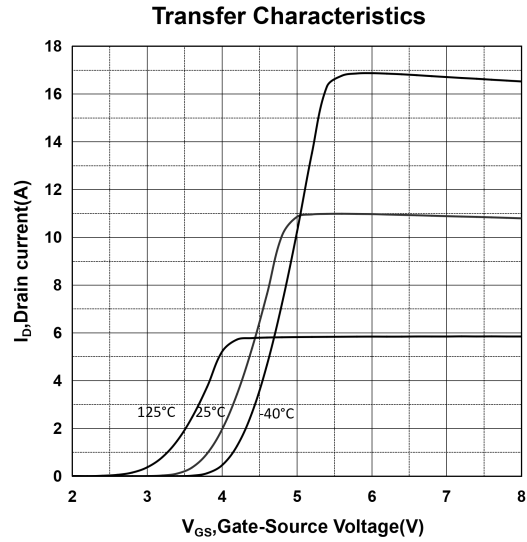
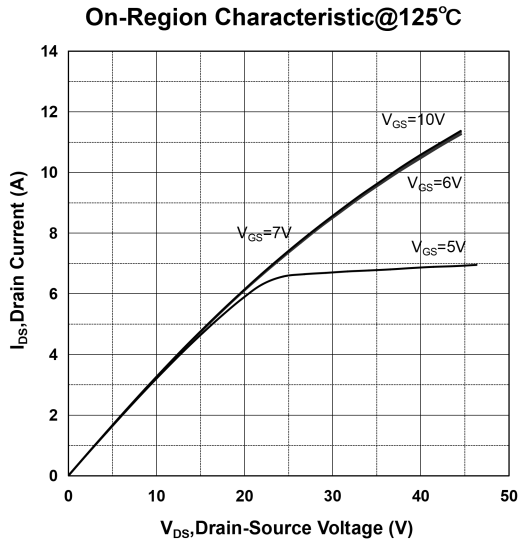
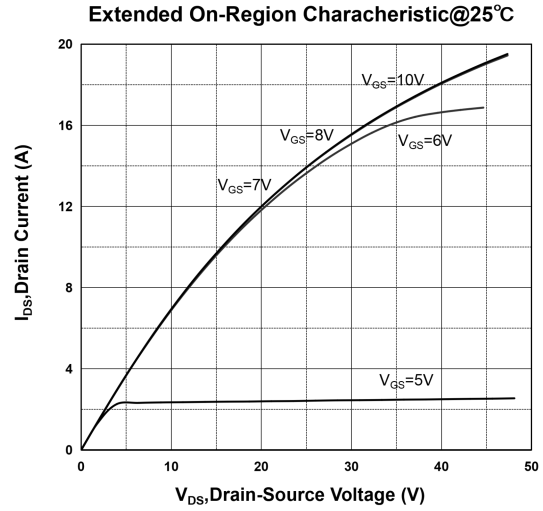
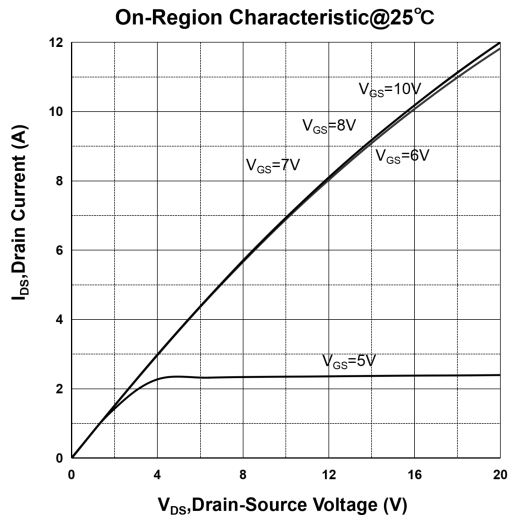
Notes:

- 1:Pulse width limited by maximum junction temperature
- 2:L=20mH,  $I_{AS}=10A$ ,  $V_{DD}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$
- 3: $I_{SD}\leq 10A$ ,  $di/dt\leq 200A/us$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ C$
- 4:Pulse Test:Pulse Width $\leq 200us$ , Duty Cycle $\leq 2\%$
- 5:Essentially independent of operating temperature

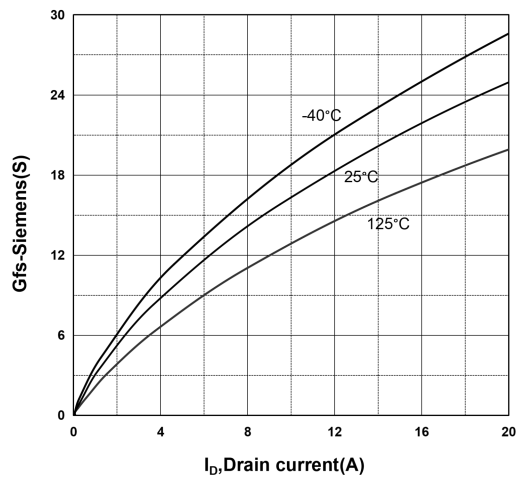
### Order information

| Order codes  | Package | Packaging |
|--------------|---------|-----------|
| MS10N100HGC0 | TO-247  | Tube      |
| MS10N100HGT1 | TO-220F | Tube      |
| MS10N100HGE0 | TO-263  | Tube      |
| MS10N100HGT0 | TO-220  | Tube      |

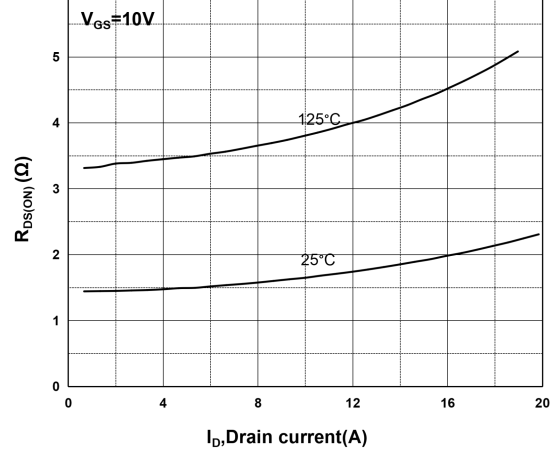
### Electrical Characteristics



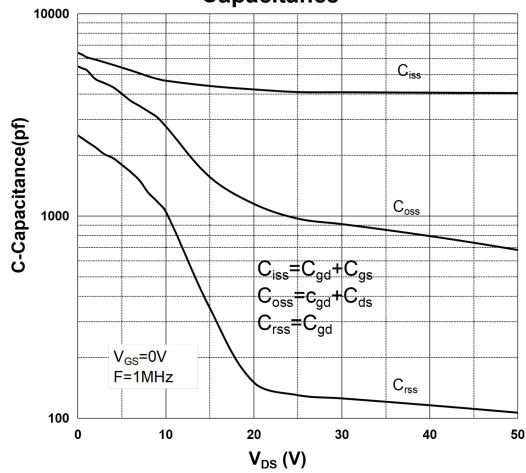
**Transconductance**



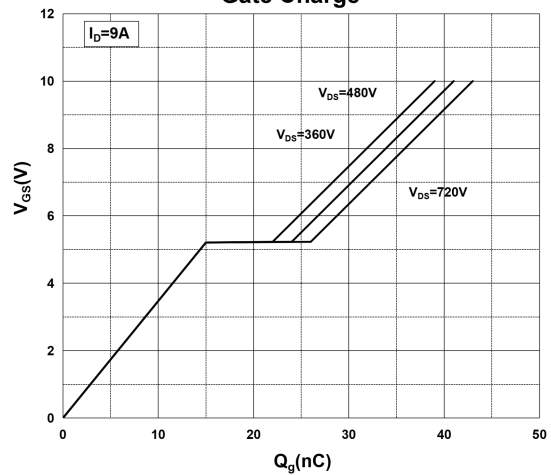
**On-Resistance Variation vs Drain Current and Gate Voltage**



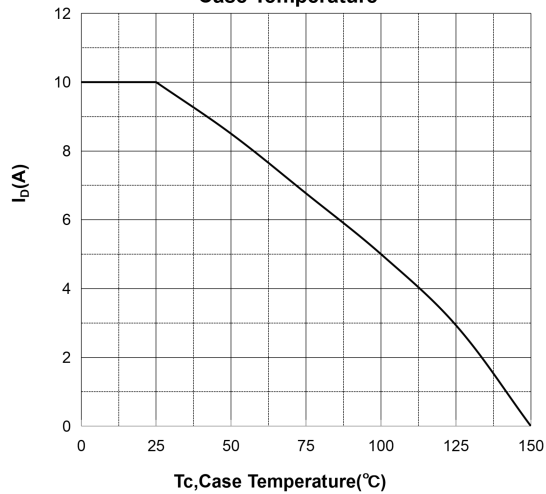
**Capacitance**



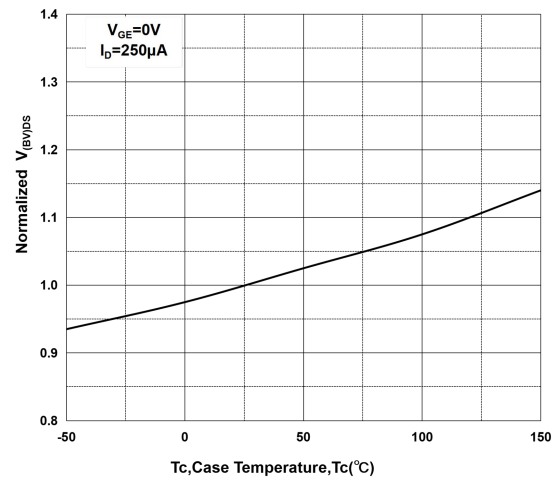
**Gate Charge**



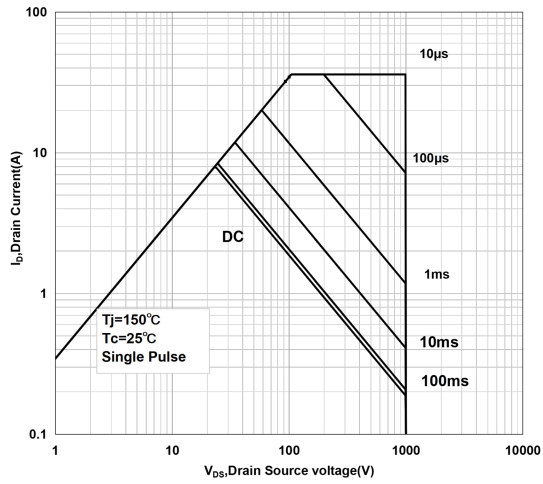
**Maximum Drain Current vs Case Temperature**



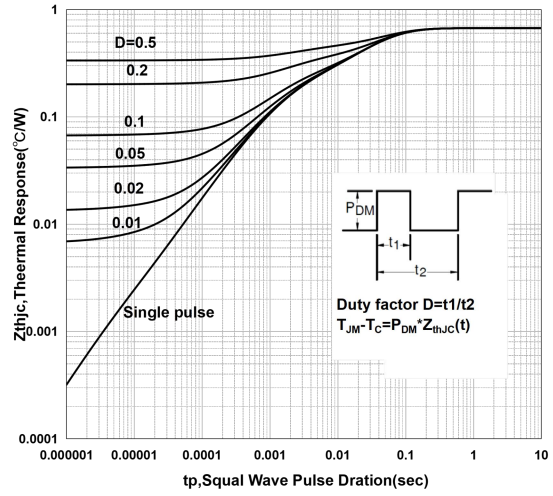
**Normalized  $V_{(BV)DS}$  vs temperature**



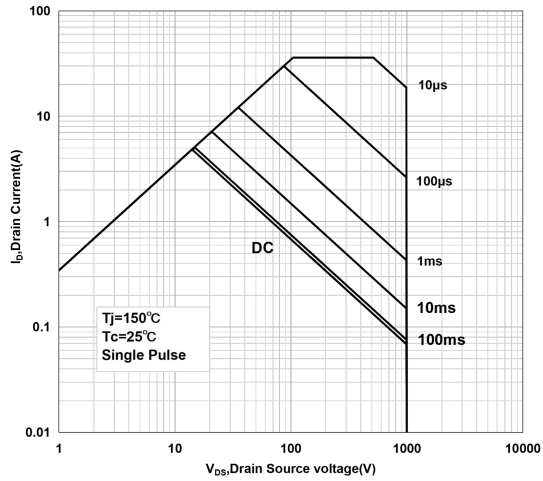
**Safe Operating Area for  
TO-247/TO-263/TO-220C**



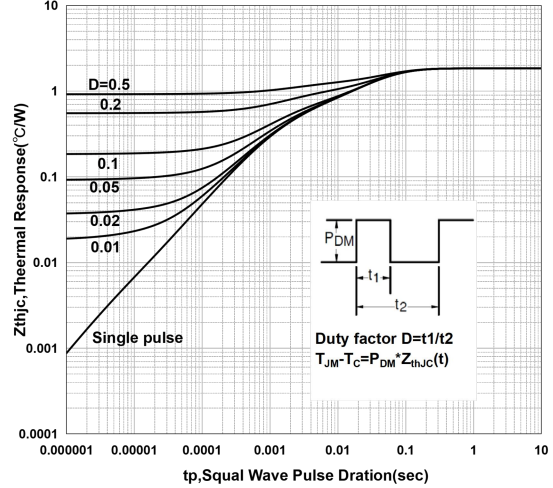
**Transient response Curve for  
TO-247/TO-263/TO-220C**



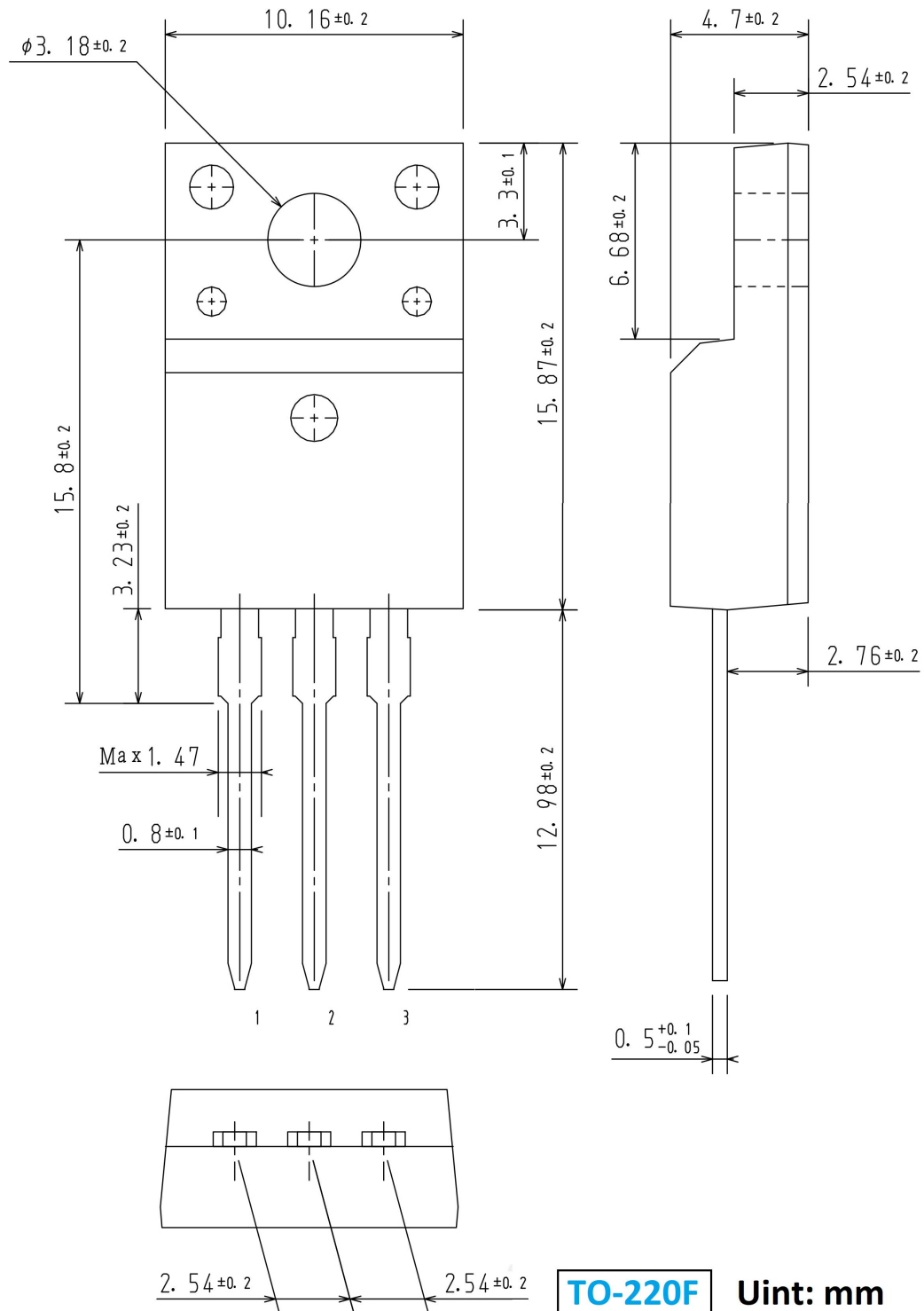
**Safe Operating Area for  
TO-220F**



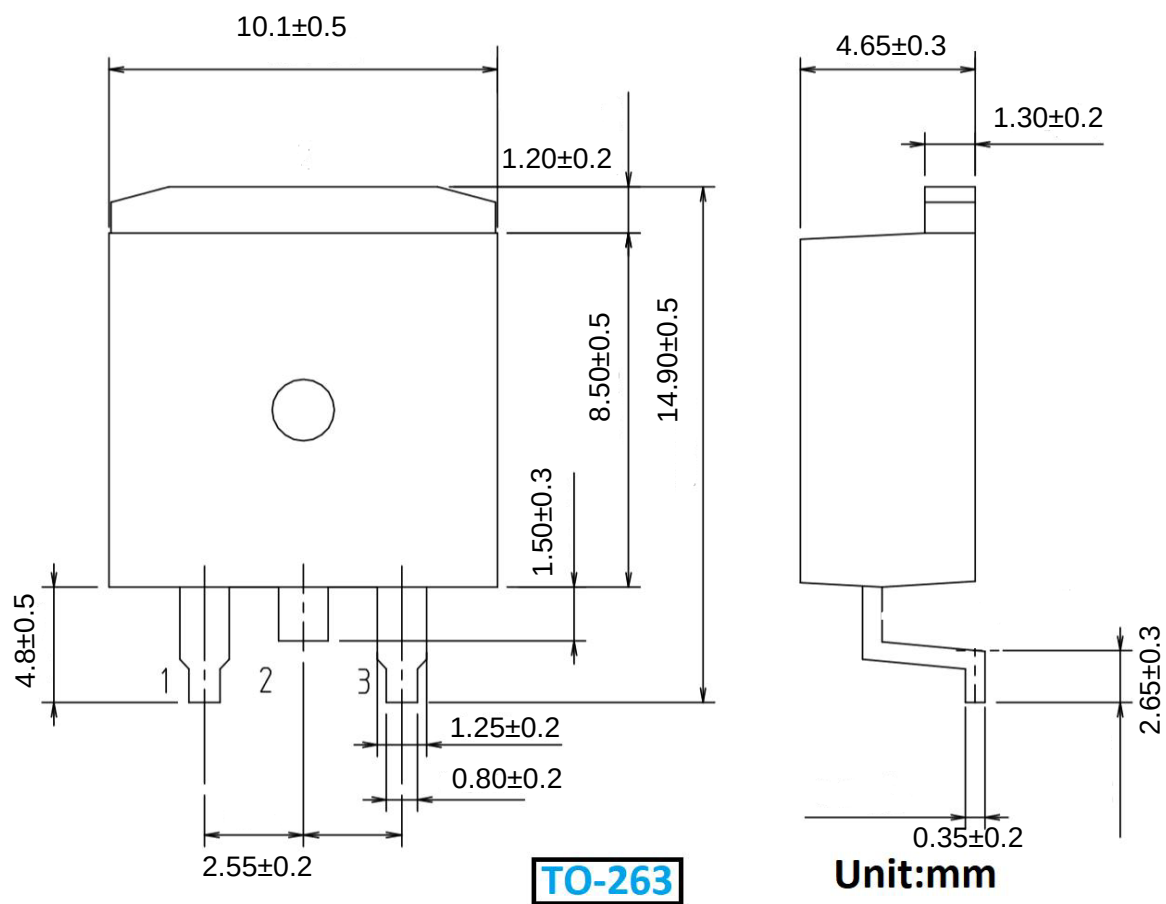
**Transient response Curve for  
TO-220F**

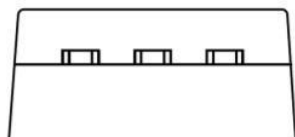
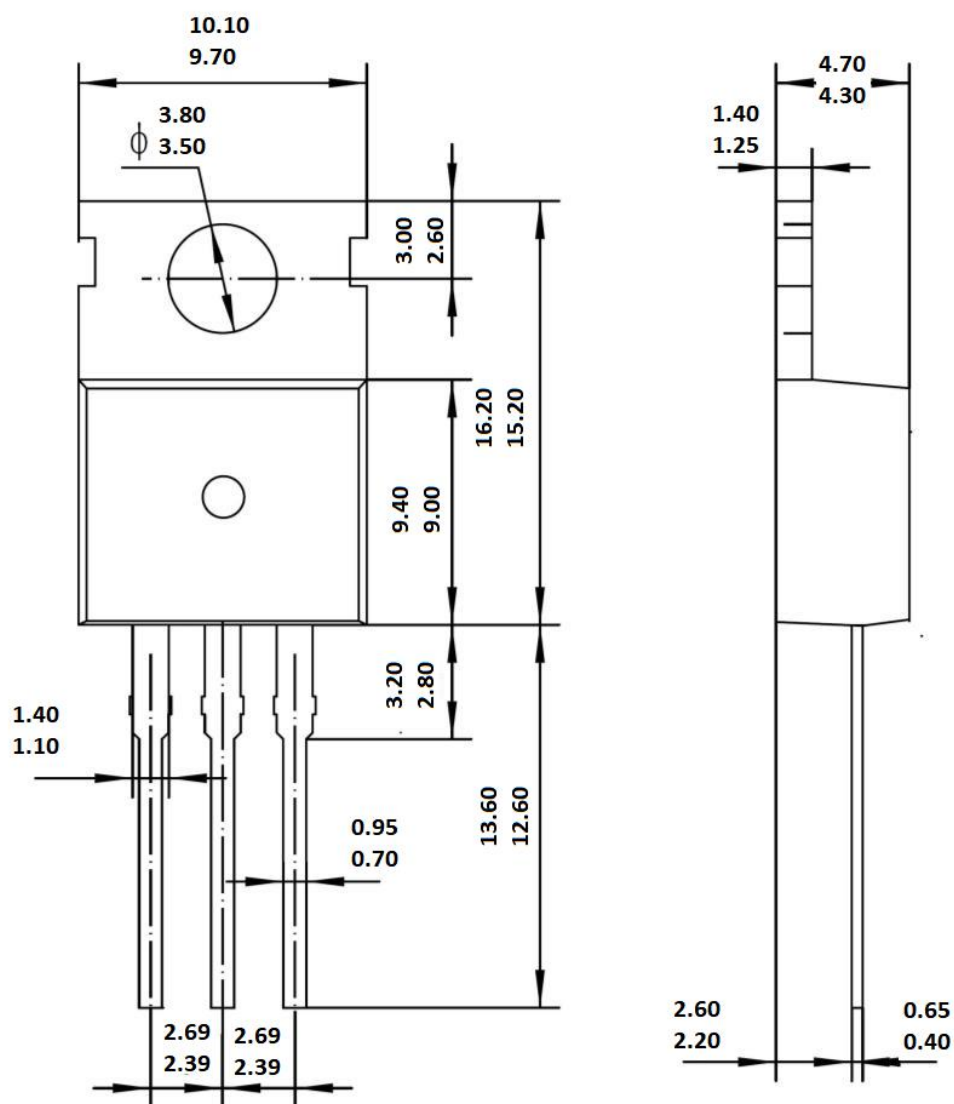












**TO-220**

**Unit: mm**