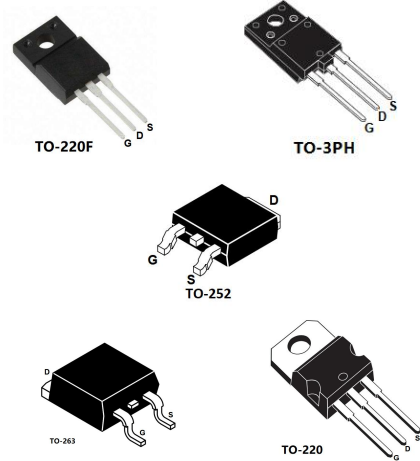
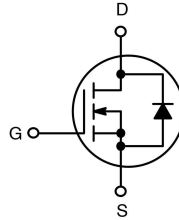


## Features

- Extremely high dv/dt capability
- 100% avalanche tested
- Gate charge minimized
- Very low intrinsic capacitances
- Very good manufacturing repeatability



## Applications

- Switching application

## Electrical ratings(Absolute maximum ratings)

| Parameter                                                                                                         | Symbol           | Value      |         |        |                   | Unit |
|-------------------------------------------------------------------------------------------------------------------|------------------|------------|---------|--------|-------------------|------|
|                                                                                                                   |                  | TO-3PH     | TO-220F | TO-252 | TO-220/<br>TO-263 |      |
| Drain-source voltage (V <sub>GS</sub> =0)                                                                         | V <sub>DS</sub>  | 1000       |         |        |                   | V    |
| Transient Gate-source voltage                                                                                     | V <sub>GSM</sub> | ±30        |         |        |                   |      |
| Continuous Gate-source voltage                                                                                    | V <sub>GSS</sub> | ±20        |         |        |                   |      |
| Avalanche current repetitive or not-repetitive (pulse width limited by T <sub>j</sub> Max)                        | I <sub>AR</sub>  | 5          |         |        |                   | A    |
| Single pulse avalanche energy (starting T <sub>j</sub> =25℃ I <sub>d</sub> =I <sub>AR</sub> V <sub>dd</sub> =50V) | E <sub>AS</sub>  | 583        |         |        |                   | mJ   |
| Drain current (continuous) at TC=25℃                                                                              | I <sub>D</sub>   | 5          |         |        |                   | A    |
| Drain current (continuous) at TC=100℃                                                                             | I <sub>D</sub>   | 3          |         |        |                   |      |
| Drain current (pulsed)                                                                                            | I <sub>DM</sub>  | 18         | 18      | 18     | 18                |      |
| Total dissipation at TC=25℃                                                                                       | P <sub>D</sub>   | 74         | 48      | 104    | 198               | W    |
| Operating junction temperature                                                                                    | T <sub>J</sub>   | -55 to 150 |         |        |                   | ℃    |
| Storage temperature                                                                                               | T <sub>STG</sub> |            |         |        |                   |      |
| Maximum lead temperature for soldering purpose                                                                    | T <sub>L</sub>   | 300        |         |        |                   | ℃    |

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

| Parameter                                            | Symbol               | Test conditions                                                                               | Min  | Typ   | Max  | Unit |
|------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|------|-------|------|------|
| On/off states                                        |                      |                                                                                               |      |       |      |      |
| Drain-source breakdown voltage                       | V <sub>(BR)DSS</sub> | I <sub>D</sub> =1mA V <sub>GS</sub> =0                                                        | 1000 |       |      | V    |
| Zero gate voltage drain current (V <sub>GS</sub> =0) | I <sub>DSS</sub>     | V <sub>DS</sub> =Max rating                                                                   |      |       | 1    | μA   |
|                                                      |                      | T <sub>C</sub> =125°C                                                                         |      |       | 50   | μA   |
| Gate body leakage current (V <sub>GS</sub> =0)       | I <sub>GSS</sub>     | V <sub>GS</sub> =±20V                                                                         |      |       | ±100 | nA   |
| Gate threshold voltage                               | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA                                        | 2.0  | -     | 5.0  | V    |
| Static drain-source on resistance                    | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V I <sub>D</sub> =1A                                                       |      | 3.5   | 4.5  | Ω    |
| Forward transconductance                             | g <sub>fs</sub>      | V <sub>DS</sub> = 27 V, I <sub>D</sub> = 5A                                                   |      | 5.6   |      | S    |
| Dynamic                                              |                      |                                                                                               |      |       |      |      |
| Parameter                                            | Symbol               | Test conditions                                                                               | Min  | Typ   | Max  | Unit |
| Input capacitance                                    | C <sub>iss</sub>     | V <sub>DS</sub> =25V, f=1MHz, V <sub>GS</sub> =0                                              |      | 506   |      | pF   |
| Output capacitance                                   | C <sub>oss</sub>     |                                                                                               |      | 59    |      |      |
| Reverse transfer capacitance                         | C <sub>rss</sub>     |                                                                                               |      | 3     |      |      |
| Total gate charge                                    | Q <sub>g</sub>       | V <sub>DD</sub> =800V, I <sub>D</sub> =2.5A<br>V <sub>GS</sub> =10V, R <sub>G</sub> = 4.7 Ω   |      | 18.68 |      | nC   |
| Gate-source charge                                   | Q <sub>gs</sub>      |                                                                                               |      | 2.1   |      |      |
| Gate-drain charge                                    | Q <sub>gd</sub>      |                                                                                               |      | 7.3   |      |      |
| Switching times                                      |                      |                                                                                               |      |       |      |      |
| Parameter                                            | Symbol               | Test conditions                                                                               | Min  | Typ   | Max  | Unit |
| Turn-on delay time                                   | t <sub>d(on)</sub>   | V <sub>DD</sub> = 800 V, I <sub>D</sub> = 2.5 A, R <sub>G</sub> = 25Ω, V <sub>GS</sub> = 10 V |      | 35.6  |      | ns   |
| Rise time                                            | t <sub>r</sub>       |                                                                                               |      | 22.9  |      |      |
| Turn-off-delay time                                  | t <sub>d(off)</sub>  |                                                                                               |      | 42.7  |      |      |
| Fall time                                            | t <sub>f</sub>       |                                                                                               |      | 13.6  |      |      |
| Source Drain Diode                                   |                      |                                                                                               |      |       |      |      |
| Parameter                                            | Symbol               | Test conditions                                                                               | Min  | Typ   | Max  | Unit |
| Source Drain Current                                 | I <sub>SD</sub>      |                                                                                               |      | 5     |      | A    |
| Source Drain Current(Pulsed)                         | I <sub>SDM</sub>     |                                                                                               |      | 18    |      | A    |
| Forward On Voltage                                   | V <sub>SD</sub>      | I <sub>SD</sub> =5A, V <sub>GS</sub> =0V                                                      |      | 0.8   | 1.2  | V    |

|                         |          |                                     |      |         |
|-------------------------|----------|-------------------------------------|------|---------|
| Reverse Recovery Time   | $T_{rr}$ | $I_{SD}=5A$ ,<br>$di/dt=200A/\mu s$ | 1.02 | $\mu s$ |
| Reverse Recovery Charge | $Q_{rr}$ | $V_R=100V, T_j=150^\circ C$         | 3.68 | $\mu C$ |

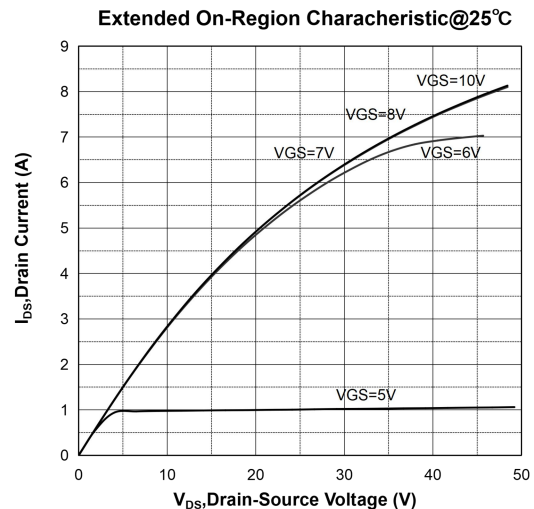
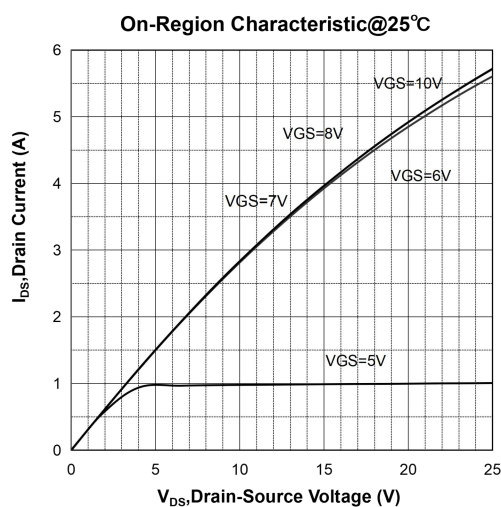
## Thermal Characteristics

| Parameter                               | Symbol      | Value  |         |        |                   | Unit         |
|-----------------------------------------|-------------|--------|---------|--------|-------------------|--------------|
|                                         |             | TO-3PH | TO-220F | TO-252 | TO-220/<br>TO-263 |              |
| Thermal resistance junction,max         | $R_{thj-c}$ | 1.69   | 2.6     | 1.2    | 0.63              | $^\circ C/W$ |
| Thermal resistance junction-ambient,max | $R_{thc-a}$ | 47.4   | 58      | 68     | 35                | $^\circ C/W$ |

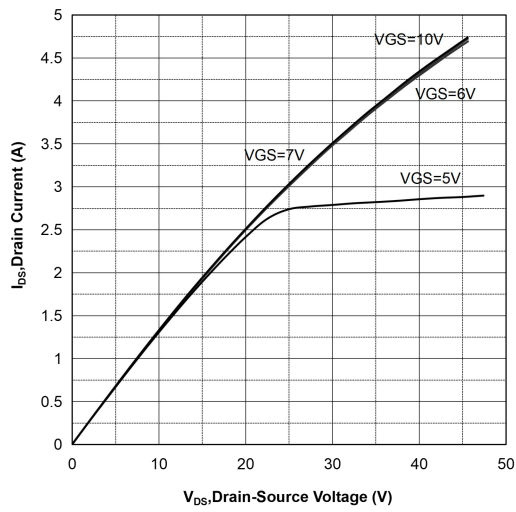
## Order codes

| Part number | Marking   | Package      |
|-------------|-----------|--------------|
| MS5N100     | MS5N100   | TO-3PH       |
| MS5N100S    | MS5N100S  | TO-220F      |
| MS5N100FT   | MS5N100FT | TO-220       |
| MS5N100FE   | MS5N100FE | TO-263/D2PAK |
| MS5N100FD   | MS5N100FD | TO-252/DPAK  |

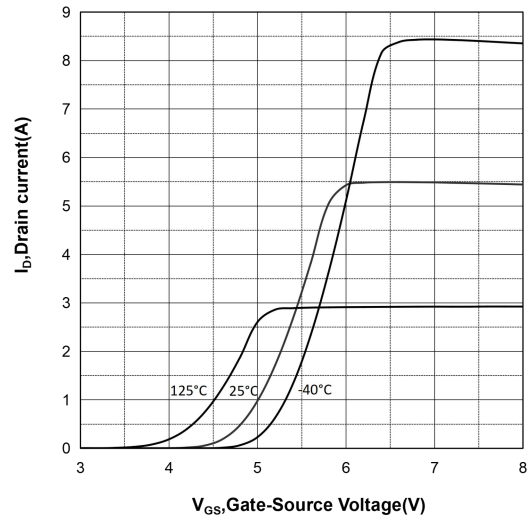
## Electrical characteristics (curves)



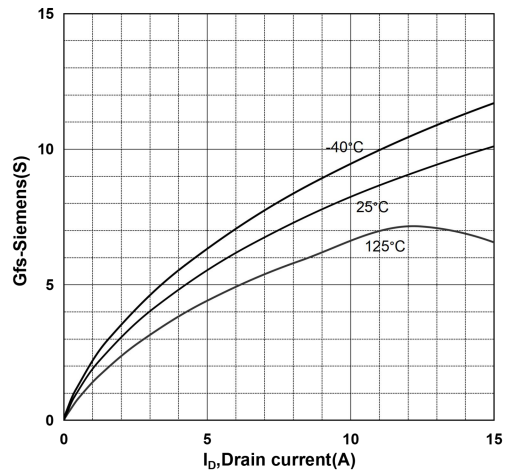
**On-Region Characteristic@125°C**



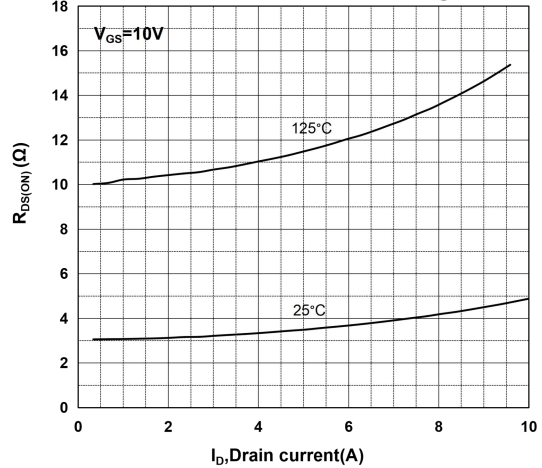
**Transfer Characteristics**



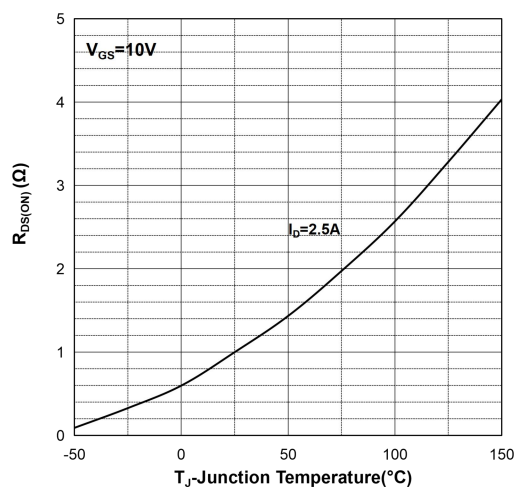
**Transconductance**



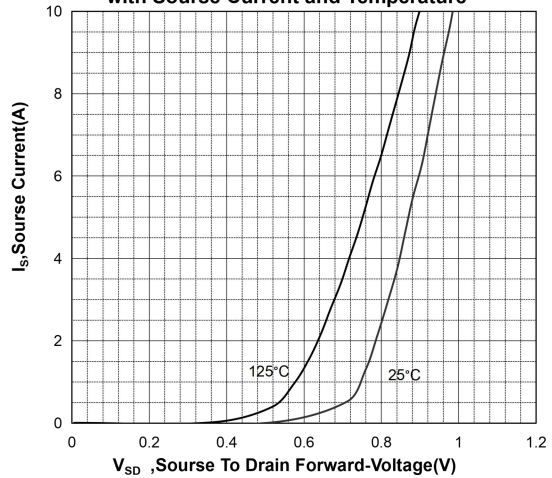
**On-Resistance Variation vs Drain Current and Gate Voltage**

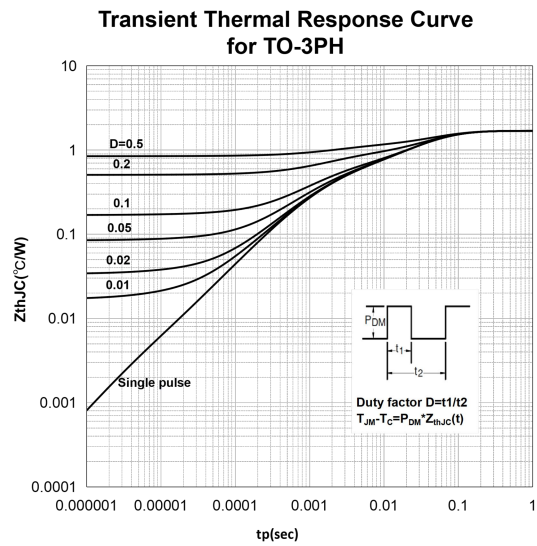
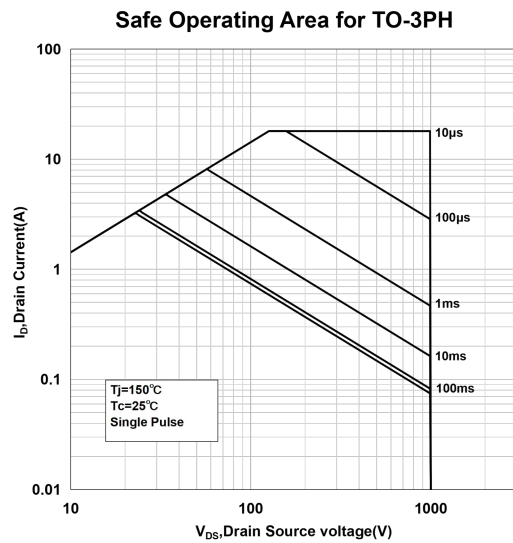
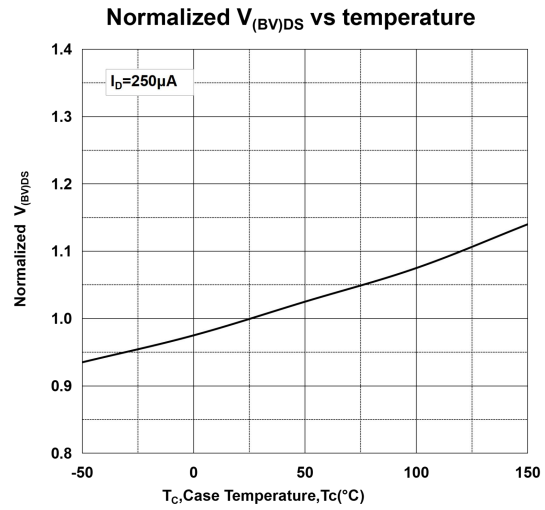
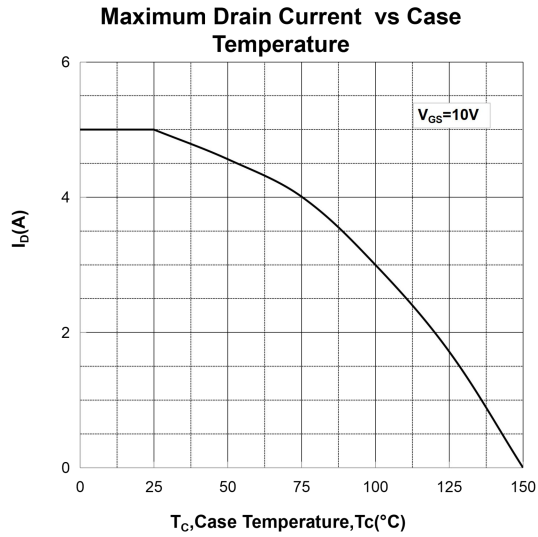
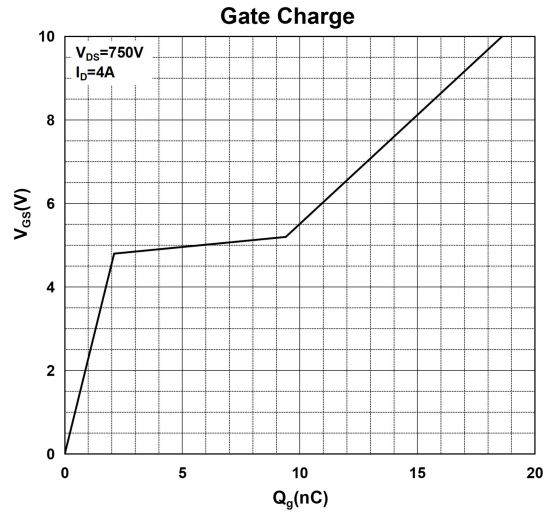
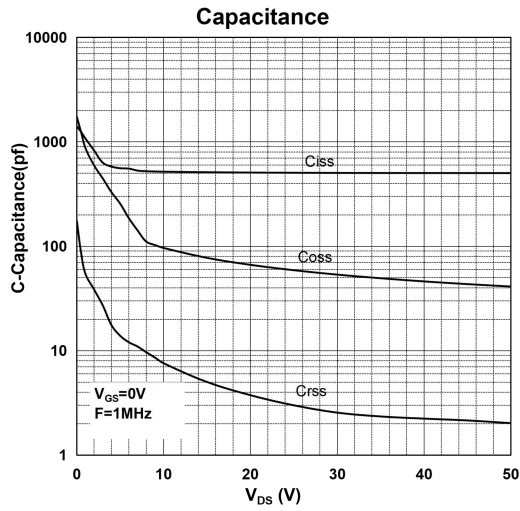


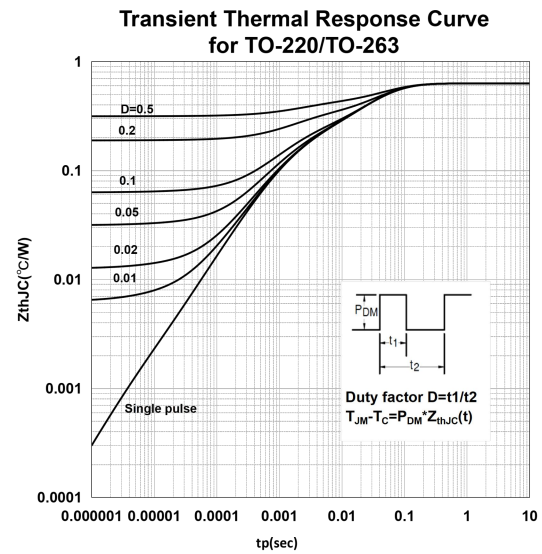
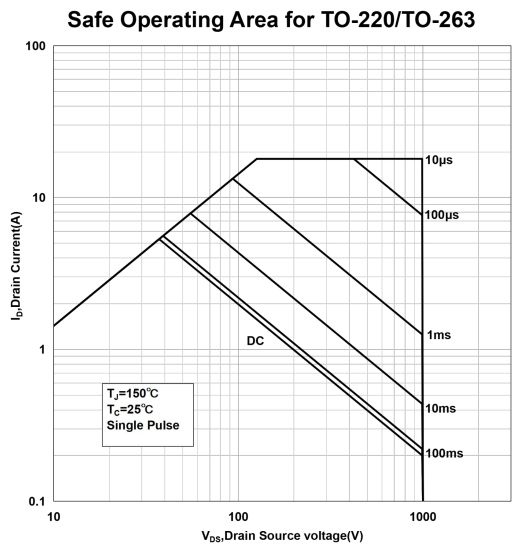
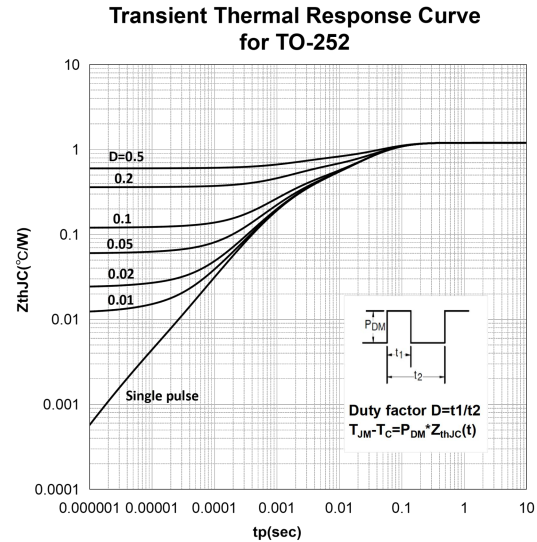
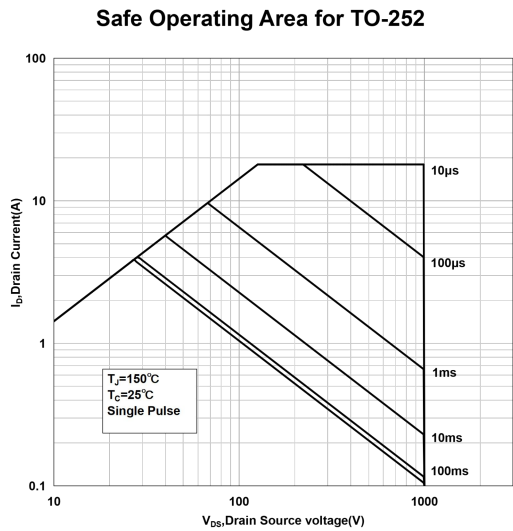
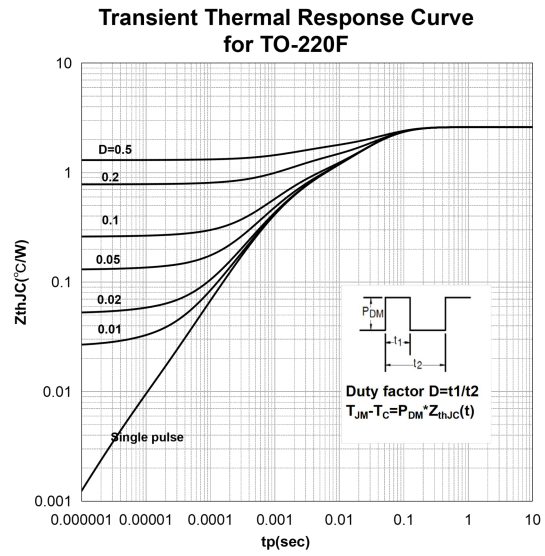
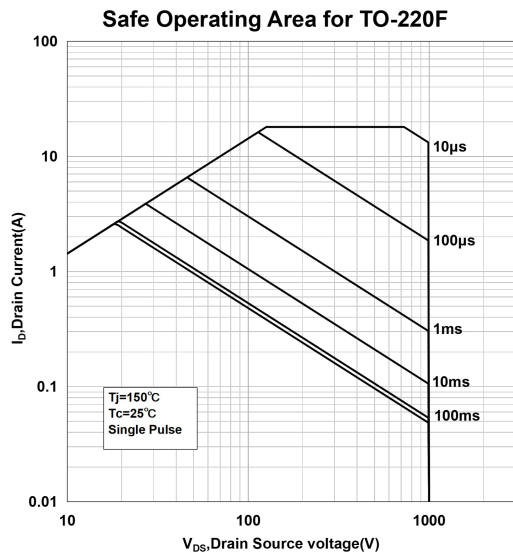
**On-Resistance Variation vs Temperature**



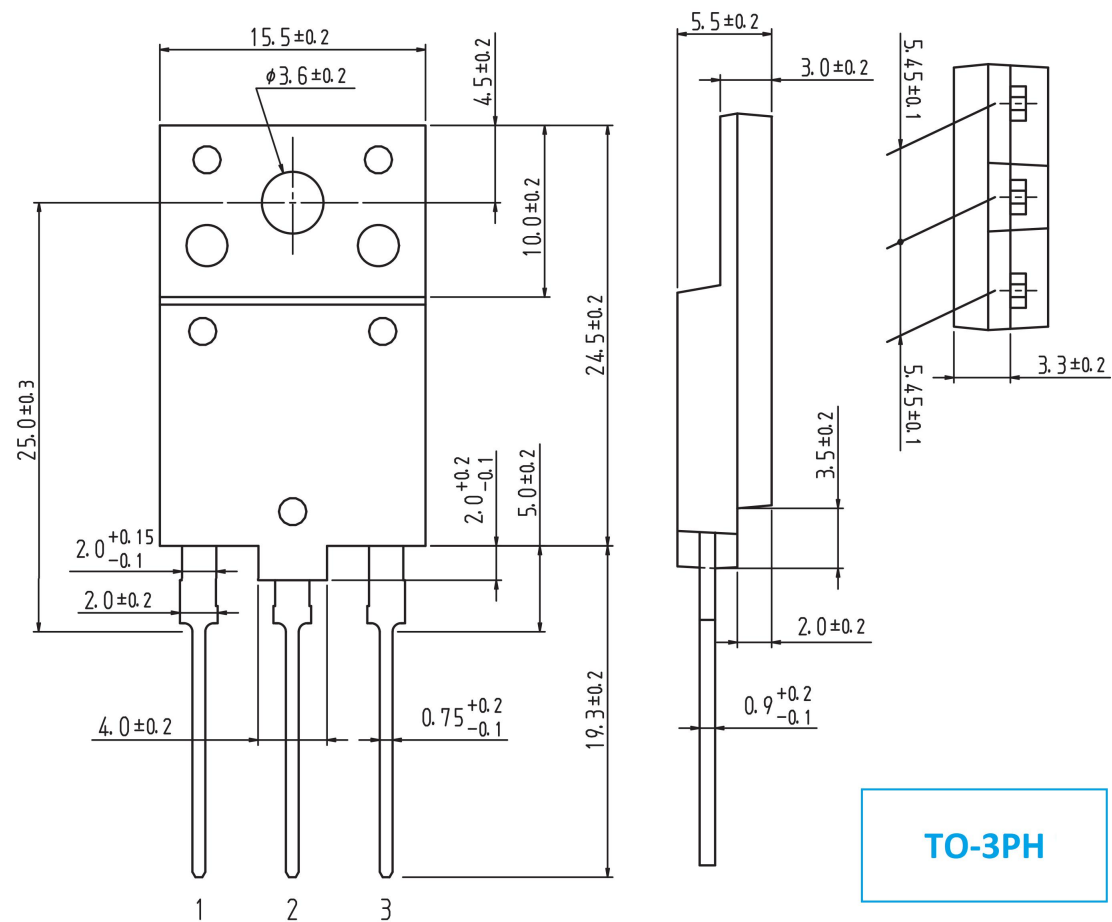
**Body Diode Forward Voltage Variation with Source Current and Temperature**

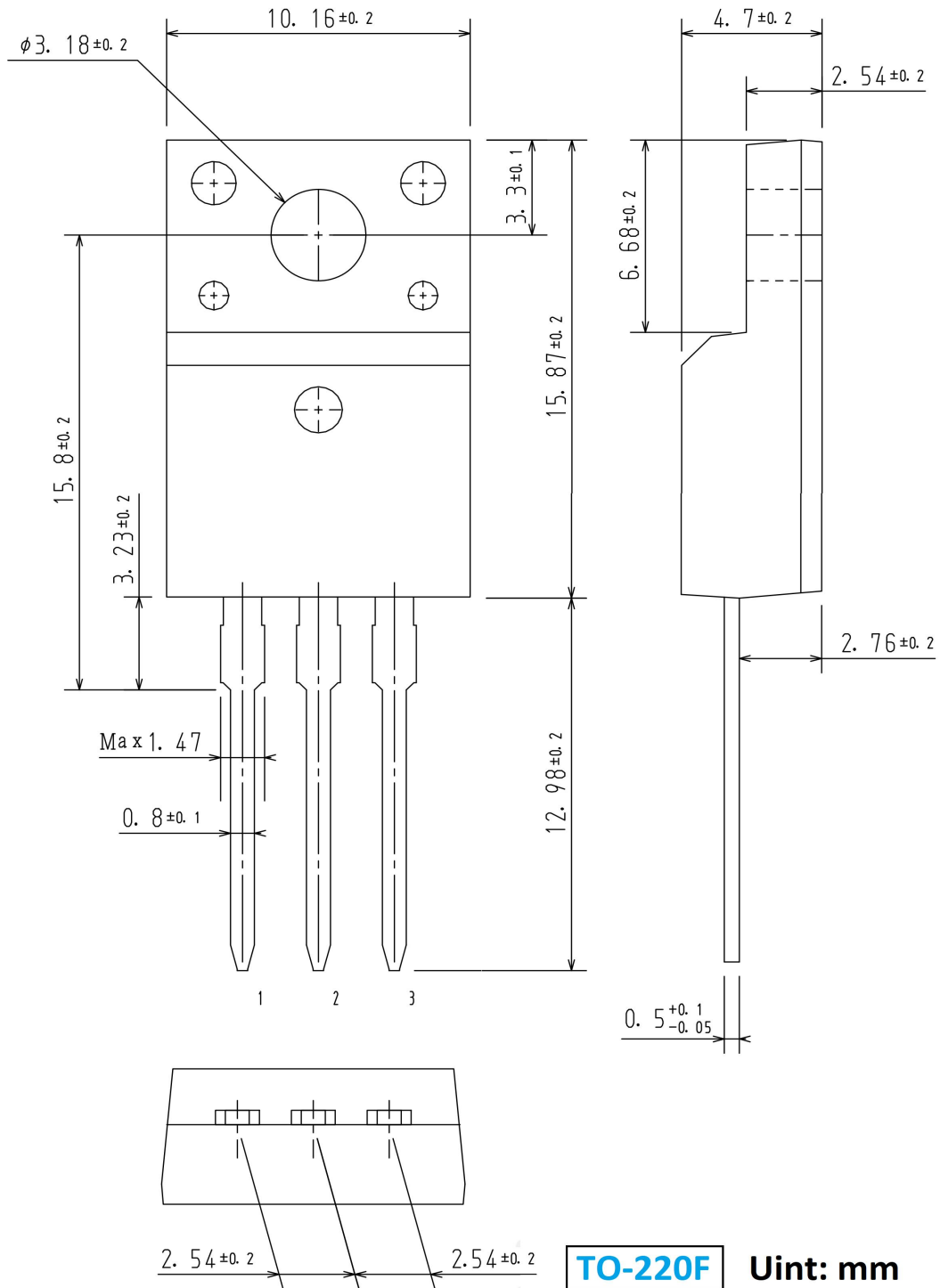


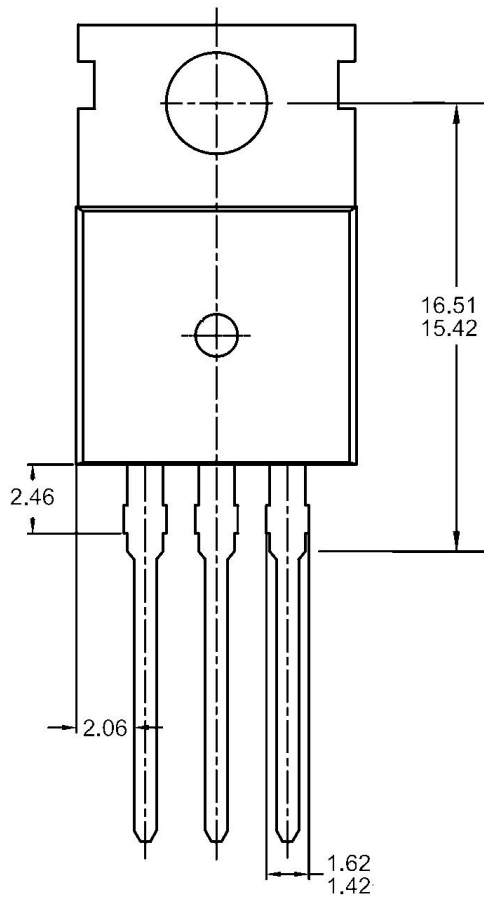




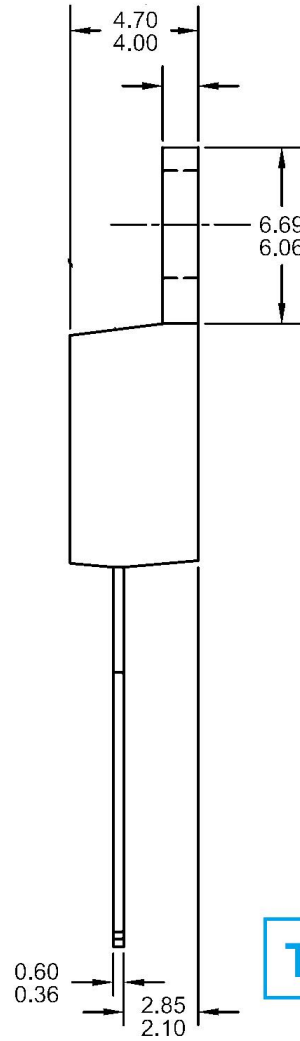
## Package outline dimension



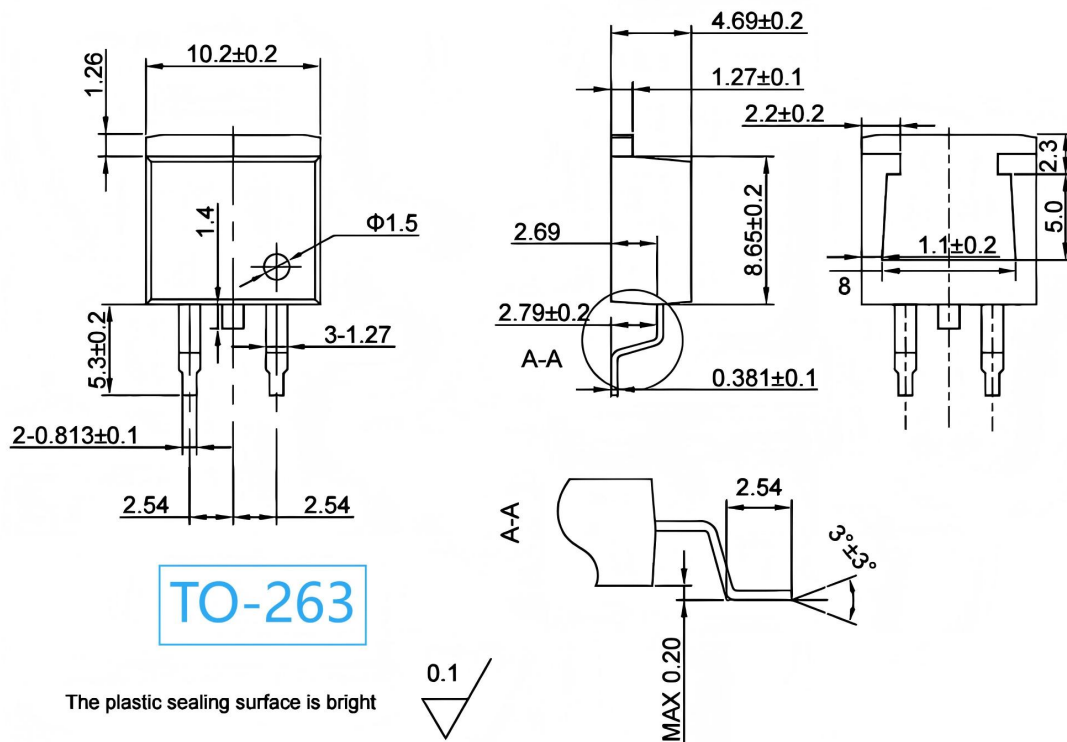




**TO-220**

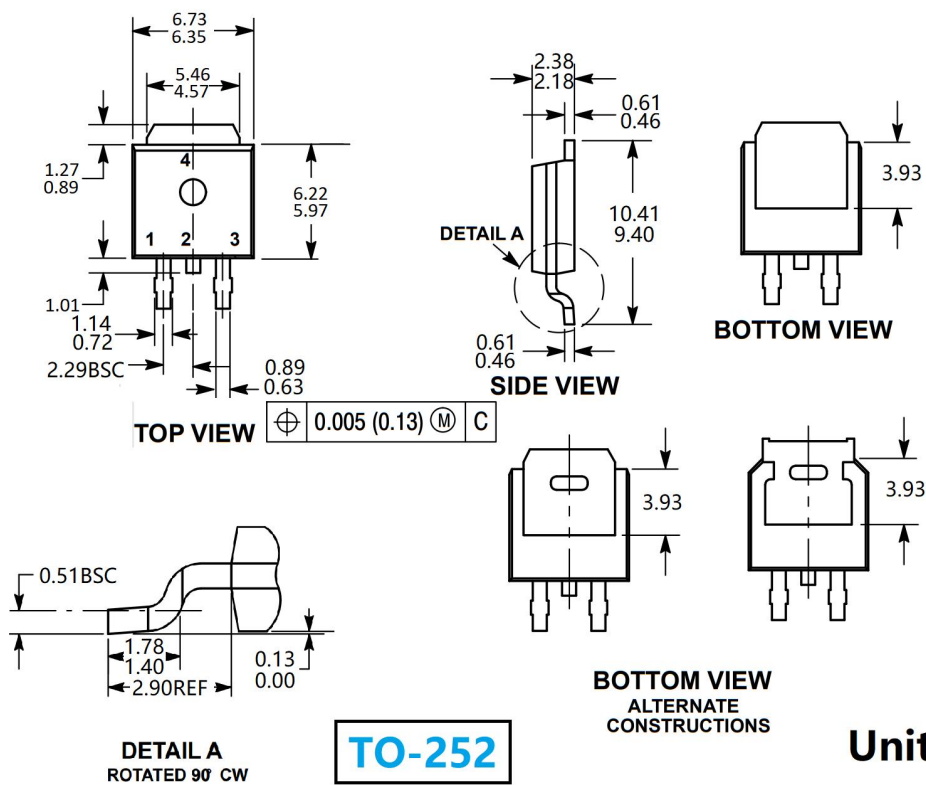


**TO-220**



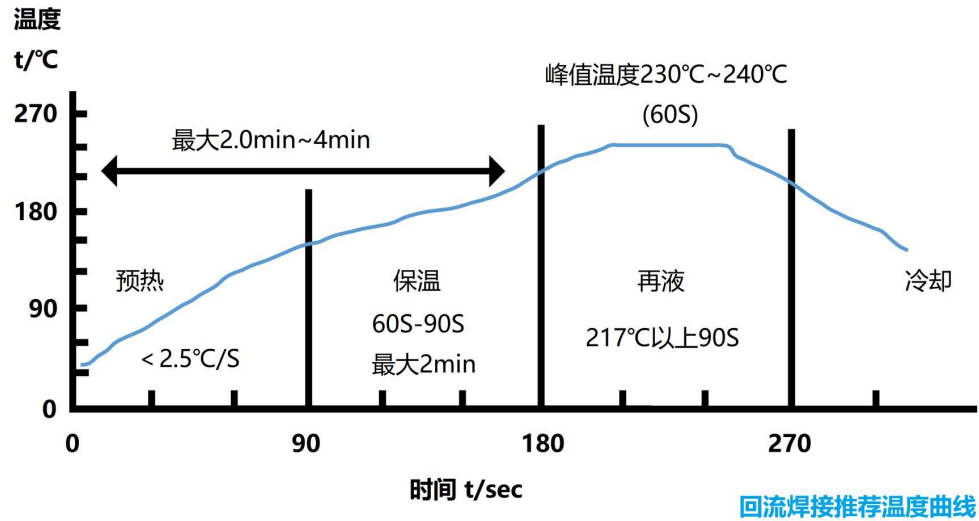
**Notes:**

1. Unmarked tolerance±0.15mm;unmarked R<0.15mm
2. The resin body is not allowed to have defects, shrinkage holes, cracks, bubbles and other harmful defects
3. The drawing indicates that the leg has reinforcement
4. Unit : mm



## Welding temperature curve :

- Reflow Solder temperature curve(MSL 3, SMD)



- Wave soldering temperature curve(Tube)

