



### Features

- Adopt FRD chip
- Low forward Voltage drop
- Fast reverse recovery time
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability

### Typical Applications

Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

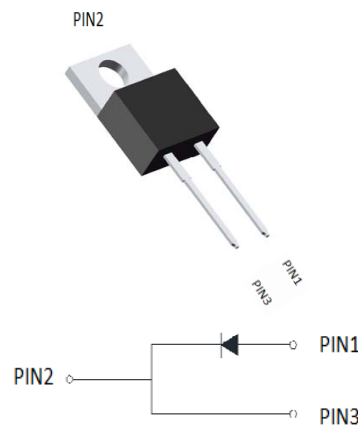
### Mechanical Data

- **Package:** TO-220AC ITO-220AC  
Molding compound meets UL 94 V-0 flammability rating, RoHS-compliant
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102
- **Polarity:** As marked

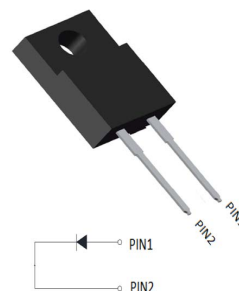
### Maximum Ratings (T<sub>a</sub>=25°C Unless otherwise specified)

| TYPE      | V <sub>RSM</sub><br>V | V <sub>RRM</sub><br>V |
|-----------|-----------------------|-----------------------|
| MTSR1560  | 600                   | 600                   |
| MTSR1560F | 600                   | 600                   |

### TO-220AC



### ITO-220AC



| Symbol                                                     | Test Conditions                                                                                                                                              | Maximum Ratings                 | Unit             |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------|
| I <sub>FRMS</sub><br>I <sub>FAVM</sub><br>I <sub>FRM</sub> | T <sub>VJ</sub> =T <sub>VJM</sub><br>T <sub>C</sub> =100°C; rectangular, d=0.5<br>t <sub>p</sub> <10us; rep. rating, pulse width limited by T <sub>VJM</sub> | 25<br>15<br>150                 | A                |
| I <sub>FSM</sub>                                           | T <sub>VJ</sub> =45°C<br>t=10ms (50Hz), sine<br>t=8.3ms (60Hz), sine                                                                                         | 200<br>220                      | A                |
|                                                            | T <sub>VJ</sub> =150°C<br>t=10ms(50Hz), sine<br>t=8.3ms(60Hz), sine                                                                                          | 185<br>195                      |                  |
| I <sup>2</sup> t                                           | T <sub>VJ</sub> =45°C<br>t=10ms (50Hz), sine<br>t=8.3ms (60Hz), sine                                                                                         | 50<br>50                        | A <sup>2</sup> s |
|                                                            | T <sub>VJ</sub> =150°C<br>t=10ms(50Hz), sine<br>t=8.3ms(60Hz), sine                                                                                          | 36<br>37                        |                  |
| T <sub>VJ</sub><br>T <sub>VJM</sub><br>T <sub>stg</sub>    |                                                                                                                                                              | -40...+175<br>175<br>-40...+175 | °C               |
| P <sub>tot</sub>                                           | T <sub>C</sub> =25°C                                                                                                                                         | 62                              | W                |
| M <sub>d</sub>                                             | Mounting torque                                                                                                                                              | 0.4...0.6                       | Nm               |
| Weight                                                     |                                                                                                                                                              | 2                               | g                |

## ■Electrical Characteristics

| Symbol                                 | Test Conditions                                                                                                         | Characteristic Values |             | Unit             |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------|-------------|------------------|
|                                        |                                                                                                                         | typ.                  | max.        |                  |
| $I_R$                                  | $T_{VJ}=25^{\circ}\text{C}; V_R=V_{RRM}$                                                                                |                       | 50          | $\mu\text{A}$    |
|                                        | $T_{VJ}=25^{\circ}\text{C}; V_R=0.8 \cdot V_{RRM}$                                                                      |                       | 25          | $\mu\text{A}$    |
|                                        | $T_{VJ}=125^{\circ}\text{C}; V_R=0.8 \cdot V_{RRM}$                                                                     |                       | 3           | $\text{mA}$      |
| $V_F$                                  | $I_F=15\text{A}; T_{VJ}=150^{\circ}\text{C}$<br>$T_{VJ}=25^{\circ}\text{C}$                                             |                       | 1.95<br>2.0 | V                |
| $V_{TO}$                               | For power-loss calculations only                                                                                        |                       | 1.12        | V                |
| $r_T$                                  | $T_{VJ}=T_{VJM}$                                                                                                        |                       | 23.2        | $\text{m}\Omega$ |
| $R_{thJC}$<br>$R_{thCK}$<br>$R_{thJA}$ |                                                                                                                         | 0.5                   | 2<br>60     | K/W              |
| $t_{rr}$                               | $I_F=1\text{A}; -di/dt=50\text{A}/\mu\text{s}; V_R=30\text{V}; T_{VJ}=25^{\circ}\text{C}$                               | 15                    | 20          | ns               |
| $I_{RM}$                               | $V_R=350\text{V}; I_F=15\text{A}; -di_F/dt=100\text{A}/\mu\text{s}; L \leq 0.05\mu\text{H}; T_{VJ}=100^{\circ}\text{C}$ | 4                     | 4.4         | A                |

## ■Thermal Characteristics ( $T_a=25^{\circ}\text{C}$ Unless otherwise specified)

| PARAMETER          |                           | SYMBOL           | UNIT                        | MTSR1560/MTSR1560F |
|--------------------|---------------------------|------------------|-----------------------------|--------------------|
| Thermal Resistance | Between junction and case | $R_{\theta J-C}$ | $^{\circ}\text{C}/\text{W}$ | 4.0                |
|                    | Between junction and Air  | $R_{\theta J-A}$ | $^{\circ}\text{C}/\text{W}$ | 50                 |

## ■Ordering Information (Example)

| PREFERRED P/N      | UNIT WEIGHT(g)  | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|--------------------|-----------------|----------------------|-------------------------|----------------------------|---------------|
| MTSR1560/MTSR1560F | Approximate 1.6 | 50                   | 1000                    | 5000                       | Tube          |

## ■Characteristics (Typical)

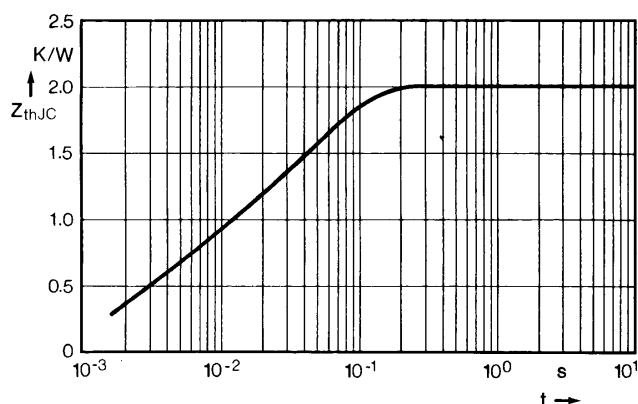


Fig. 7 Transient thermal impedance junction to case.

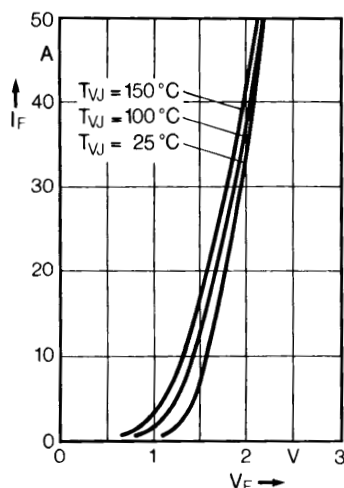


Fig. 1 Forward current versus voltage drop.

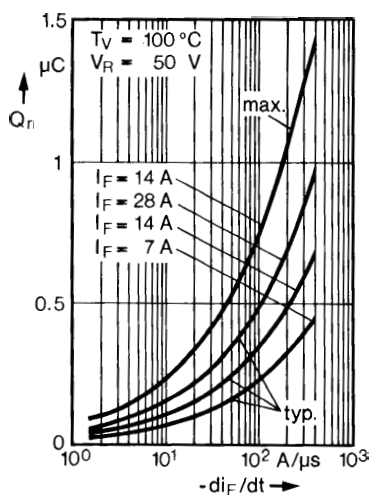


Fig. 2 Recovery charge versus  $-di_F/dt$ .

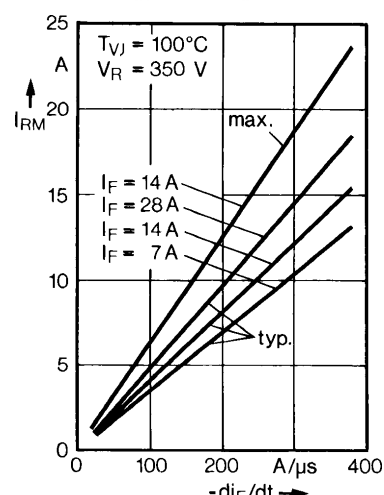


Fig. 3 Peak reverse current versus  $-di_F/dt$ .

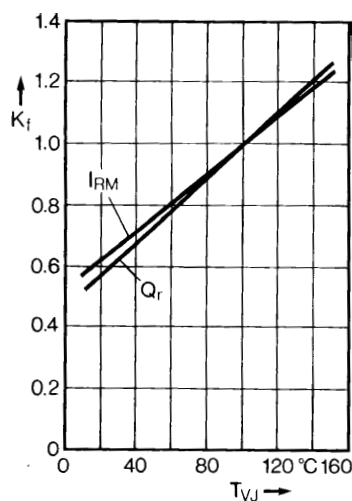


Fig. 4 Dynamic parameters versus junction temperature.

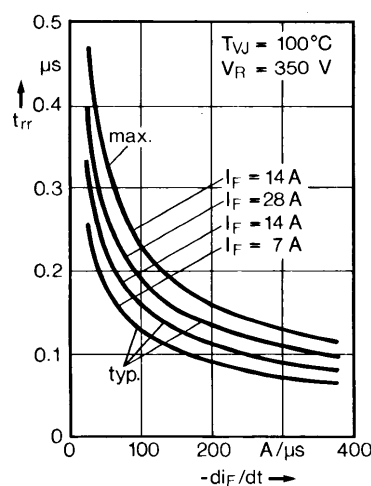


Fig. 5 Recovery time versus  $-di_F/dt$ .

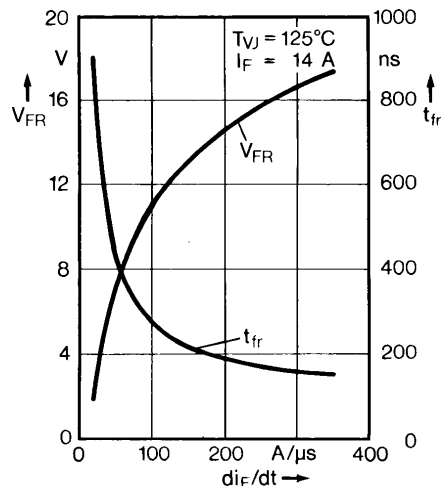
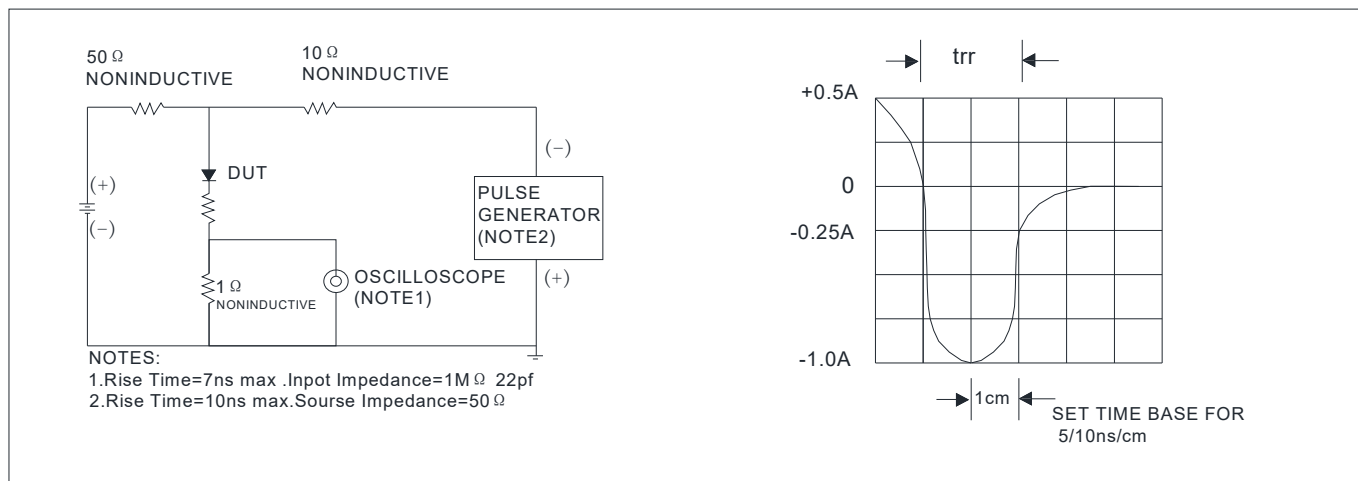
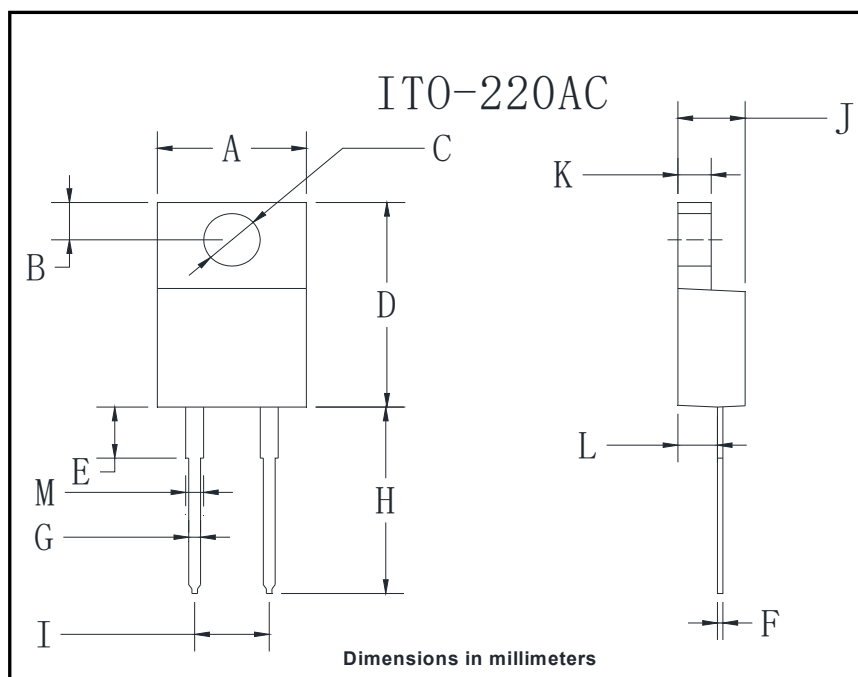


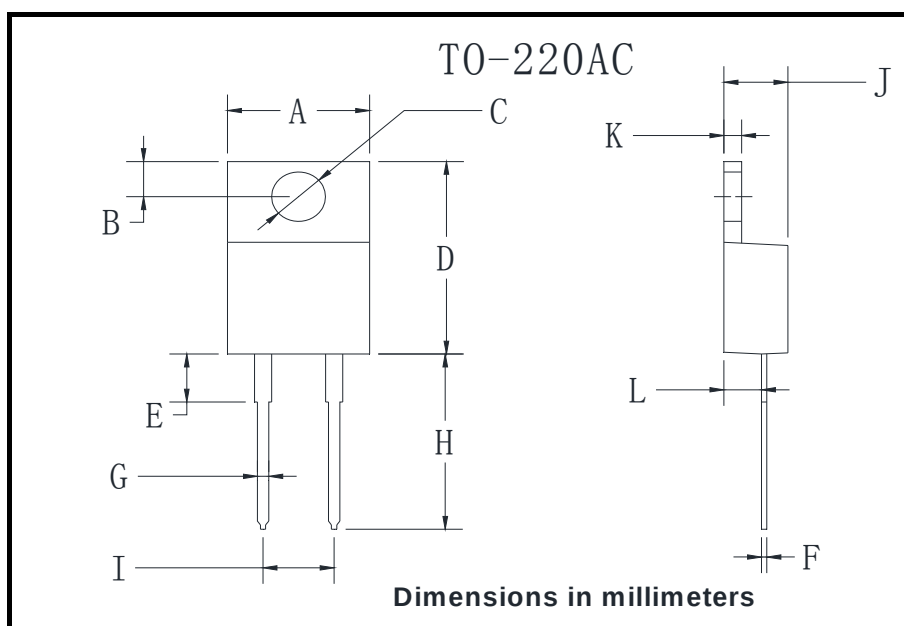
Fig. 6 Peak forward voltage versus  $di_F/dt$ .

FIG.5: Diagram of circuit and Testing wave form of reverse recovery time





| ITO-220AC |       |       |
|-----------|-------|-------|
| Dim       | Min   | Max   |
| A         | 9.8   | 10.2  |
| B         | 2.25  | 2.75  |
| C         | 2.95  | 3.45  |
| D         | 14.75 | 15.25 |
| E         | 3.5   | 4.1   |
| F         | 0.45  | 0.75  |
| G         | 0.45  | 0.75  |
| H         | 13.35 | 14.15 |
| I         | 4.97  | 5.23  |
| J         | 4.3   | 4.8   |
| K         | 2.5   | 2.74  |
| L         | 2.58  | 2.82  |
| M         | 1.03  | 1.43  |



| TO-220AC |       |       |
|----------|-------|-------|
| Dim      | Min   | Max   |
| A        | 9.95  | 10.35 |
| B        | 2.55  | 2.95  |
| C        | 3.75  | 4.05  |
| D        | 14.95 | 15.25 |
| E        | 3.75  | 4.25  |
| F        | 0.26  | 0.5   |
| G        | 0.68  | 0.94  |
| H        | 13.3  | 13.9  |
| I        | 4.86  | 5.26  |
| J        | 4.38  | 4.78  |
| K        | 1.14  | 1.4   |
| L        | 2.37  | 2.79  |

| Packge   | Packing    | Box Size<br>L×W×H(mm) | Quatity(pcs/box) | Carton Size<br>L×W×H(mm) | Quatity(pcs/carton) |
|----------|------------|-----------------------|------------------|--------------------------|---------------------|
| TO-220AC | 50pcs/Tube | 558×148×38            | 1000             | 565×225×175              | 5000                |