# FR151 THRU FR157

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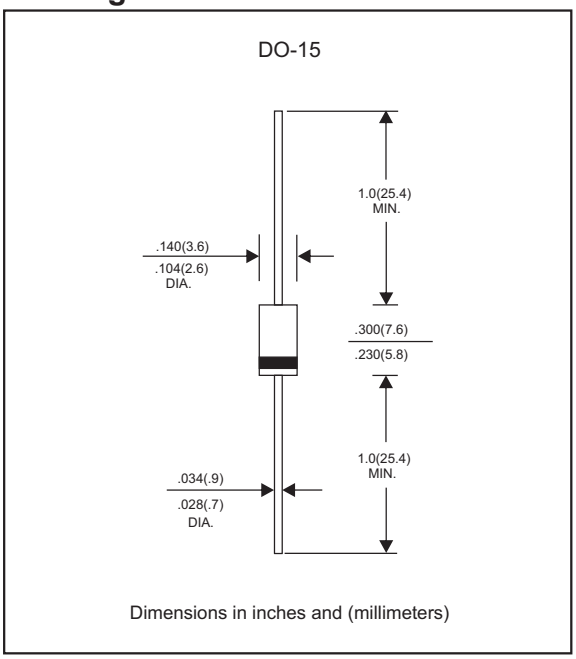
# FR151 THRU FR157

## 1.5A Axial Leaded Fast Recovery Rectifiers - 50V-1000V

## Features

- Axial lead type devices for through hole design.
- High current capability.
- Fast switching for high efficiency.
- High surge current capability.
- Silicon rubber coating chip junction.
- Lead-free parts meet RoHS requirments.
- Suffix "-H" indicates Halogen-free parts, ex. FR151-H.

## Package outline




## Mechanical data

- Epoxy : UL94-V0 rated flame retardant
- Case : Molded plastic, DO-15
- Lead : Axial leads, solderable per MIL-STD-202, Method 208 guranteed
- Polarity: Color band denotes cathode end
- Mounting Position : Any
- Weight : Approximated 0.40 gram

## Maximum ratings and Electrical Characteristics (AT $T_A$=25°C unless otherwise noted)

| PARAMETER | CONDITIONS | Symbol | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Forward rectified current | See Fig.2 | $I_O$ | | | 1.5 | A |
| Forward surge current | 8.3ms single half sine-wave (JEDEC methode) | $I_{FSM}$ | | | 50 | A |
| Reverse current | $V_R$ = $V_{RRM}$ $T_J$ = 25°C | $I_R$ | | | 5.0 | μA |
| | $V_R$ = $V_{RRM}$ $T_J$ = 100°C | | | | 100 | |
| Diode junction capacitance | f=1MHz and applied 4V DC reverse voltage | $C_J$ | | 25 | | pF |
| Storage temperature | | $T_{STG}$ | -65 | | +175 | °C |

| SYMBOLS | $V_{RRM}$ *1 (V) | $V_{RMS}$ *2 (V) | $V_R$ *3 (V) | $V_F$ *4 (V) | $t_{rr}$ *5 (ns) | Operating temperature $T_J$, (°C) |
|---|---|---|---|---|---|---|
| FR151 | 50 | 35 | 50 | 1.30 | 150 | -55 to +125 |
| FR152 | 100 | 70 | 100 | | | |
| FR153 | 200 | 140 | 200 | | | |
| FR154 | 400 | 280 | 400 | | | |
| FR155 | 600 | 420 | 600 | | 250 | |
| FR156 | 800 | 560 | 800 | | 500 | |
| FR157 | 1000 | 700 | 1000 | | | |

Note 1. Reverse recovery time test condition, $I_F$=0.5A, $I_R$=1.0A, $I_{RR}$=0.25A

*1 Repetitive peak reverse voltage

*2 RMS voltage

*3 Continuous reverse voltage

*4 Maximum forward voltage@$I_F$=1.5A

*5 Maximum Reverse recovery time, note 1

# Rating and characteristic curves (FR151 THRU FR157)

FIG.1-TYPICAL FORWARD CHARACTERISTICS

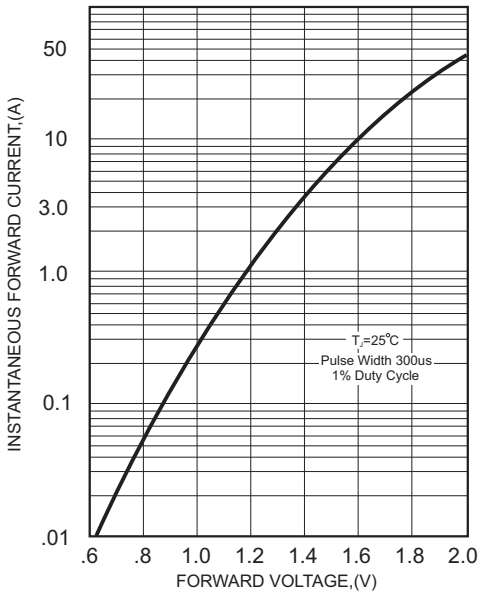



FIG.2-TYPICAL FORWARD CURRENT DERATING CURVE

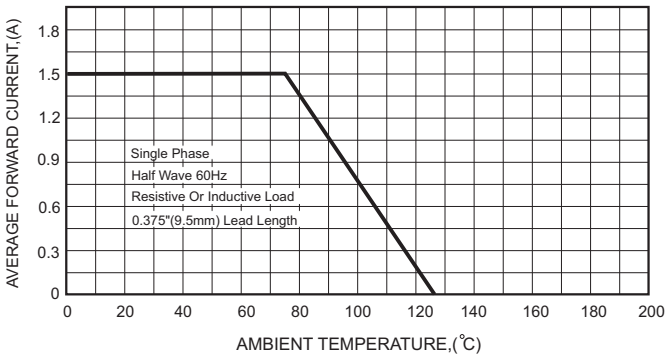
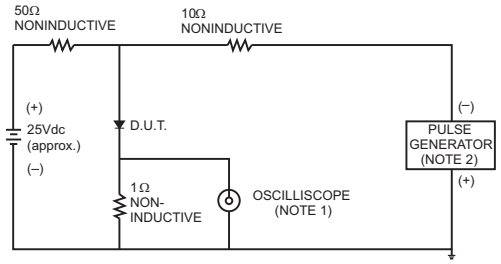



FIG.3- TEST CIRCUIT DIAGRAM AND REVERSE RECOVERY TIME CHARACTERISTICS




NOTES: 1. Rise Time= 7ns max., Input Impedance= 1 megohm.22pF.

2. Rise Time= 10ns max., Source Impedance= 50 ohms.

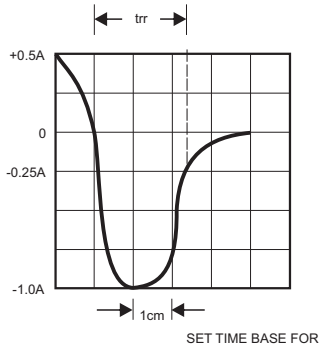



FIG.4-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT

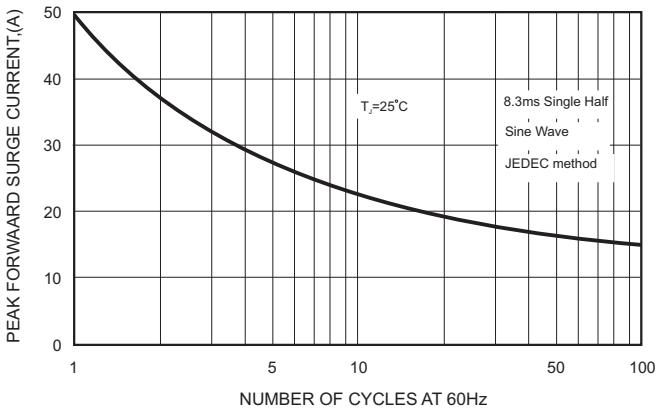
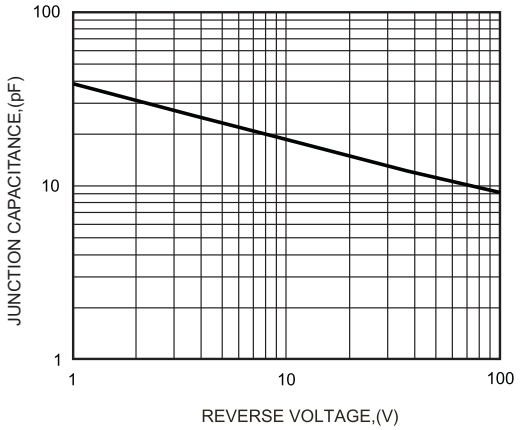



FIG.5-TYPICAL JUNCTION CAPACITANCE



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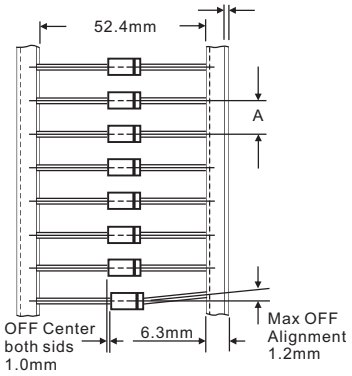
## Pinning information

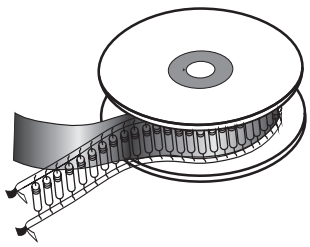
| Pin | Simplified outline | Symbol |
|---|---|---|
| Pin1 cathode<br>Pin2 anode |  |  |

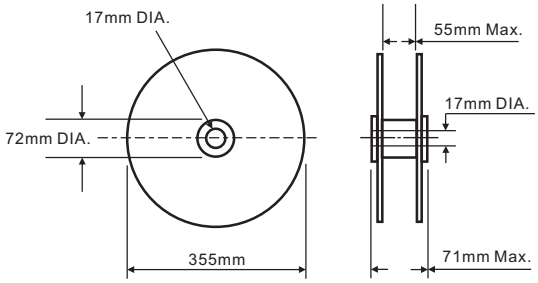
## Marking

| Type number | Marking code |
|---|---|
| FR151 | FR151 |
| FR152 | FR152 |
| FR153 | FR153 |
| FR154 | FR154 |
| FR155 | FR155 |
| FR156 | FR156 |
| FR157 | FR157 |

## Taping & bulk specifications for AXIAL devices






REEL PACKING

| DEVICE CASE TYPE | Q'TY 1 (PCS / REEL) | COMPONENT SPACING "A" in FIG. A | CARTON SIZE (m/m) | Q'TY 2 (PCS / CARTON) | APPROX. CROSS WEIGHT(kg) |
|---|---|---|---|---|---|
| DO-15 | 4,000 | 5 mm | 360 * 340 * 370 | 16,000 | 9.9 |

AMMO PACKING

| DEVICE CASE TYPE | Q'TY 1 (PCS / BOX) | INNER BOX SIZE (m/m) | CARTON SIZE (m/m) | Q'TY 2 (PCS / CARTON) | APPROX. CROSS WEIGHT(kg) |
|---|---|---|---|---|---|
| DO-15 | 3,000 | 260 * 83 * 160 | 440 * 270 * 340 | 30,000 | 14.3 |

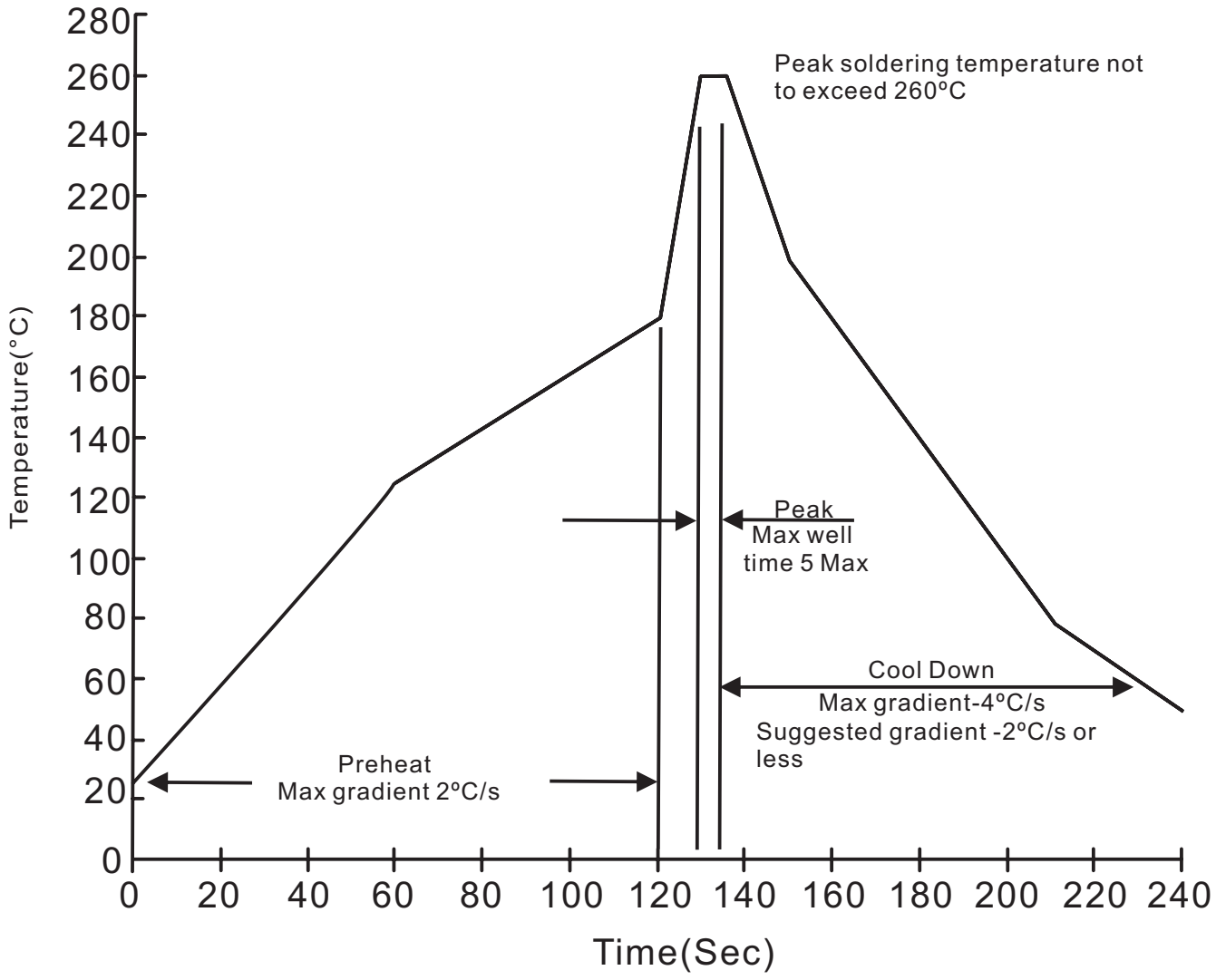
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BULK PACKING

| DEVICE CASE TYPE | Q'TY 1 (PCS / BOX) | INNER BOX SIZE (m/m) | CARTON SIZE (m/m) | Q'TY 2 (PCS / CARTON) | APPROX. CROSS WEIGHT(kg) |
|---|---|---|---|---|---|
| DO-15 | 500 | 194 * 84 * 20 | 465 * 220 * 260 | 25,000 | 12.9 |

**Suggested thermal profiles for soldering processes**

1.Lead free temperature profile wave-soldering



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## High reliability test capabilities

| Item Test | Conditions | Reference |
|---|---|---|
| 1. Solder Resistance | at 260±5°C for 10±2sec.<br>immerse body into solder 1/16"±1/32" | MIL-STD-750D<br>METHOD-2031 |
| 2. Solderability | at 245±5°C for 5 sec. | MIL-STD-202F<br>METHOD-208 |
| 3. Pull Test | 1.0kg in axial lead direction for 10 sec.<br>$I_F=I_O$ | MIL-STD-202F<br>METHOD-211A |
| 4. Bend Lead | 1.0kg weight applied to each lead bending<br>arc 90°±5° for 3 times | MIL-STD-202F<br>METHOD-211A |
| 5. High Temperature Reverse Bias | $V_R$=80% rate at $T_J$=125°C for 168 hrs. | MIL-STD-750D<br>METHOD-1038 |
| 6. Forward Operation Life | Rated average rectifier current at $T_A$=25°C for 500hrs. | MIL-STD-750D<br>METHOD-1027 |
| 7. Intermittent Operation Life | $T_A$ = 25°C, $I_F$ = $I_O$<br>On state: power on for 5 min.<br>off state: power off for 5 min,<br>on and off for 500 cycles. | MIL-STD-750D<br>METHOD-1036 |
| 8. Pressure Cooker | 15$P_{SIG}$ at $T_A$=121°C for 4 hrs. | JESD22-A102 |
| 9. Temperature Cycling | -55°C to +125°C dwelled for 30 min.<br>and transferred for 5min. total 10 cycles. | MIL-STD-750D<br>METHOD-1051 |
| 10. Forward Surge | 8.3ms single half sine-wave one surge. | MIL-STD-750D<br>METHOD-4066-2 |
| 11. Humidity | at $T_A$=85°C, RH=85% for 1000hrs. | MIL-STD-750D<br>METHOD-1021 |
| 12. High Temperature Storage Life | at 175°C for 1000 hrs. | MIL-STD-750D<br>METHOD-1031 |