International
IOR Rectifier

# T..HF SERIES

## POWER RECTIFIER DIODES

**T-Modules**

40 A
70 A
85 A
110 A

### Features

- Electrically isolated base plate
- Types up to 1200 $V_{RRM}$
- 3500 $V_{RMS}$ isolating voltage
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- UL E78996 approved
- RoHS Compliant

### Description

These series of T-modules use standard recovery power rectifier diodes. The semiconductors are electrically isolated from the metal base, allowing common heatsink and compact assembly to be built.
Applications include power supplies, battery charges, welders, motor controls and general industrial current rectification.

### Major Ratings and Characteristics

| Parameters | | T40HF | T70HF | T85HF | T110HF | Units |
|---|---|---|---|---|---|---|
| $I_{F(AV)}$ | | 40 | 70 | 85 | 110 | A |
| $I_{F(RMS)}$ | | 63 | 110 | 134 | 173 | °C |
| $I_{FSM}$ | 50Hz | 570 | 1200 | 1700 | 2000 | A |
| | 60Hz | 600 | 1250 | 1800 | 2100 | A |
| $I^2t$ | 50Hz | 1630 | 7100 | 14500 | 20500 | $A^2s$ |
| | 60Hz | 1500 | 6450 | 13500 | 18600 | $A^2s$ |
| $I^2\sqrt{t}$ | | 16300 | 70700 | 148700 | 204300 | $A^2\sqrt{s}$ |
| $V_{RRM}$ range | | 100 to 1200 | | | | V |
| $T_J$ | | -40 to 150 | | | | °C |

## ELECTRICAL SPECIFICATIONS

### Voltage Ratings

| Type number | Voltage Code | $V_{RRM}$ , maximum repetitive peak reverse voltage V | $V_{RSM}$ , maximum non-repetitive peak reverse voltage V | $I_{RRM}$ max. $T_J$= @ 25°C µ A |
|---|---|---|---|---|
| 10 | 100 | 150 | | |
| T40HF.. | 20 | 200 | 300 | |
| T70HF.. | 40 | 400 | 500 | |
| T85HF.. | 60 | 600 | 700 | 100 |
| T110HF.. | 80 | 800 | 900 | |
| | 100 | 1000 | 1100 | |
| | 120 | 1200 | 1300 | |

### Forward Conduction

| | Parameters | T40HF | T70HF | T85HF | T110HF | Units | Conditions | | |
|---|---|---|---|---|---|---|---|---|---|
| $I_{F(AV)}$ | Max. average fwd current | 40 | 70 | 85 | 110 | A | 180° conduction, half sine wave | | |
| | @ Case temperature | 85 | 85 | 85 | 85 | °C | | | |
| $I_{F(RMS)}$ | Max. RMS forward current | 63 | 110 | 134 | 173 | A | | | |
| $I_{FSM}$ | Max. peak, one-cycle | 570 | 1200 | 1700 | 2000 | A | t = 10ms | No voltage | Sinusoidal half wave, Initial $T_J = T_J$ max. |
| | forward, non-repetitive | 600 | 1250 | 1800 | 2100 | | t = 8.3ms | reapplied | |
| | surge current | 480 | 1000 | 1450 | 1700 | | t = 10ms | 100% $V_{RRM}$ | |
| | | 500 | 1050 | 1500 | 1780 | | t = 8.3ms | reapplied | |
| $I^2t$ | Maximum $I^2t$ for fusing | 1630 | 7100 | 14500 | 20500 | $A^2s$ | t = 10ms | No voltage | |
| | | 1500 | 6450 | 13500 | 18600 | | t = 8.3ms | reapplied | |
| | | 1150 | 5000 | 10500 | 14500 | | t = 10ms | 100% $V_{RRM}$ | |
| | | 1050 | 4570 | 9600 | 13200 | | t = 8.3ms | reapplied | |
| $I^2\sqrt{t}$ | Maximum $I^2\sqrt{t}$ for fusing | 16300 | 70700 | 148700 | 204300 | $A^2\sqrt{s}$ | t = 0.1 to 10ms, no voltage reapplied | | |
| $V_{F(TO)1}$ | Low level value of threshold voltage | 0.66 | 0.76 | 0.68 | 0.68 | V | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, @ $T_J$ max. | | |
| $V_{F(TO)2}$ | High level value of threshold voltage | 0.84 | 0.95 | 0.90 | 0.86 | | $(I > \pi \times I_{F(AV)})$, @ $T_J$ max. | | |
| $r_{f1}$ | Low level value of forward slope resistance | 4.3 | 2.4 | 1.76 | 1.56 | mΩ | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, @ $T_J$ max. | | |
| $r_{f2}$ | High level value of forward slope resistance | 3.1 | 1.7 | 1.08 | 1.12 | | $(I > \pi \times I_{F(AV)})$, @ $T_J$ max. | | |
| $V_{FM}$ | Max. forward voltage drop | 1.30 | 1.35 | 1.27 | 1.35 | V | $I_{FM} = \pi \times I_{F(AV)}$, $T_J$ = 25°C, tp = 400 µs square pulse<br>Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$ | | |

### Blocking

| | Parameters | T40HF | T70HF | T85HF | T110HF | Units | Conditions |
|---|---|---|---|---|---|---|---|
| $I_{RRM}$ | Max. peak reverse leakage current | 15 | 15 | 20 | 20 | mA | $T_J$ = 150 °C |
| $V_{INS}$ | RMS isolation voltage | 3500 | 3500 | 3500 | 3500 | V | 50Hz, circuit to base, all terminals shorted<br>$T_J$ = 25 °C , t = 1s |

## ΔR Conduction (per Junction)

(The following table shows the increment of thermal resistance $R_{thJC}$ when devices operate at different conduction angles than DC)

| Devices | Sinusoidal conduction @ $T_J$ max. | | | | | Rectangular conduction @ $T_J$ max. | | | | | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 180° | 120° | 90° | 60° | 30° | 180° | 120° | 90° | 60° | 30° | |
| T40HF | 0.12 | 0.14 | 0.18 | 0.27 | 0.46 | 0.09 | 0.15 | 0.20 | 0.28 | 0.46 | K/W |
| T70HF | 0.09 | 0.11 | 0.14 | 0.20 | 0.35 | 0.07 | 0.11 | 0.15 | 0.21 | 0.35 | |
| T85HF | 0.08 | 0.09 | 0.12 | 0.18 | 0.31 | 0.06 | 0.10 | 0.13 | 0.19 | 0.31 | |
| T110HF | 0.05 | 0.07 | 0.09 | 0.14 | 0.23 | 0.05 | 0.08 | 0.10 | 0.15 | 0.24 | |

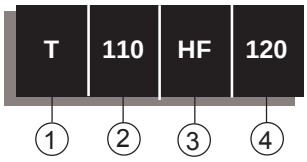
## Thermal and Mechanical Specifications

| | Parameters | | T40HF | T70HF | T85HF | T110HF | Units | Conditions |
|---|---|---|---|---|---|---|---|---|
| $T_J$ | Max. junction operating temperature range | | -40 to 150 | | | | °C | |
| $T_{stg}$ | Max. storage temperature range | | -40 to 150 | | | | °C | |
| $R_{thJC}$ | Max. thermal resistance, junction to case | | 1.36 | 0.69 | 0.62 | 0.47 | K/W | DC operation, per junction |
| $R_{thCS}$ | Max. thermal resistance, case to heatsink | | 0.2 | | | | K/W | Mounting surface smooth, flat and greased |
| T | Mounting torque ± 10% | to heatsink | 1.3 ± 10% | | | | Nm | M3.5 mounting screws **(2)** non lubricated threads |
| | | terminals | 3 ± 10% | | | | | M5 screw terminals |
| wt | Approximate weight | | 54 | | | | g | See outline table |
| | Case style | | D-56 | | | | | T type |

**(2)** A mounting compound is recommended and the torque should be rechecked after a period of about 3 hours to allow for the spread of the compound

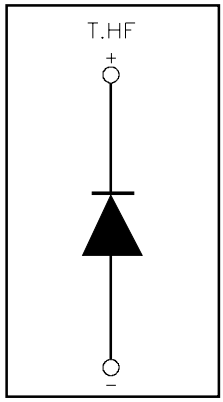
## Ordering Information Table

**Device Code**

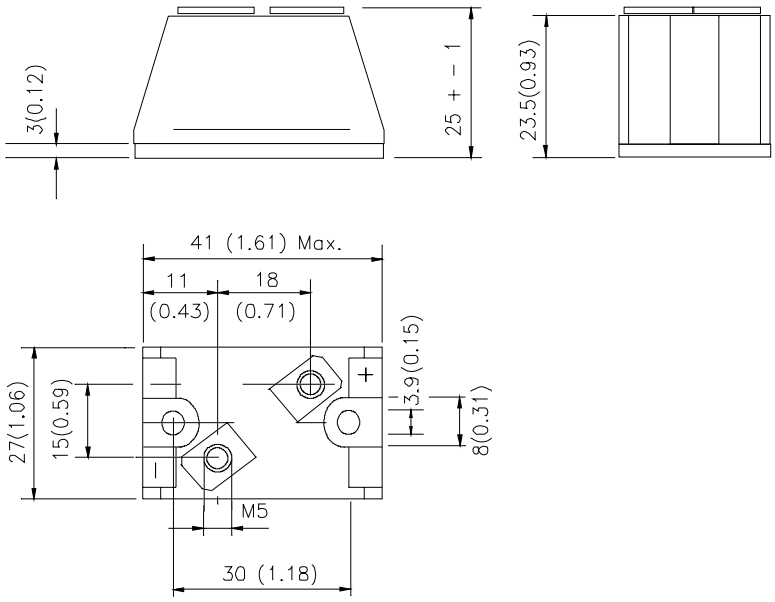



**1** - Module type
**2** - Current rating
**3** - Circuit configuration **
**4** - Voltage code : code x 10 = $V_{RRM}$

**Circuit configuration ****



Outline Table




All dimensions in millimeters (inches)

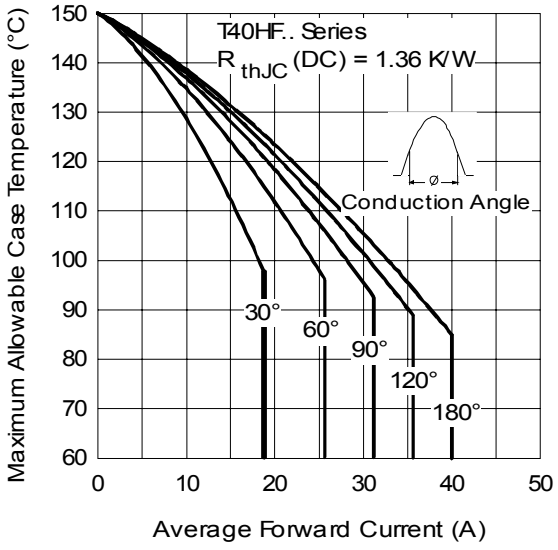



Fig. 1 - Current Ratings Characteristics

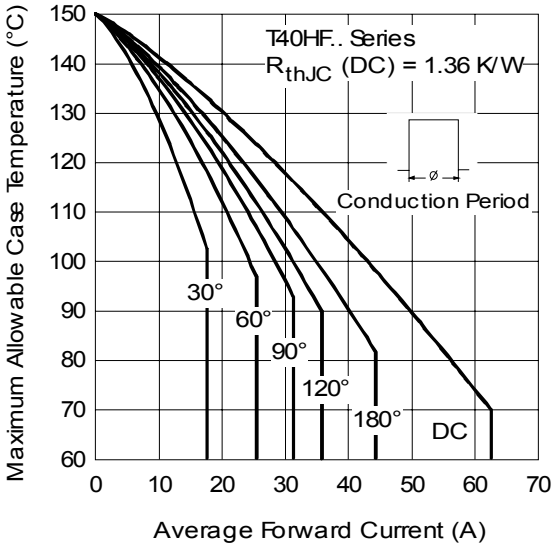



Fig. 2 - Current Ratings Characteristics

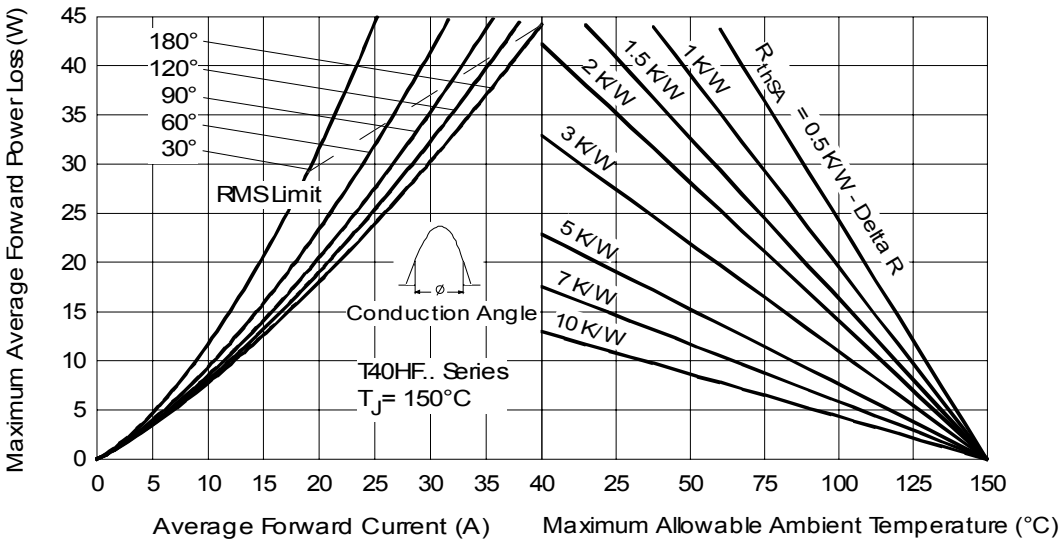



Fig. 3 - Forward Power Loss Characteristics

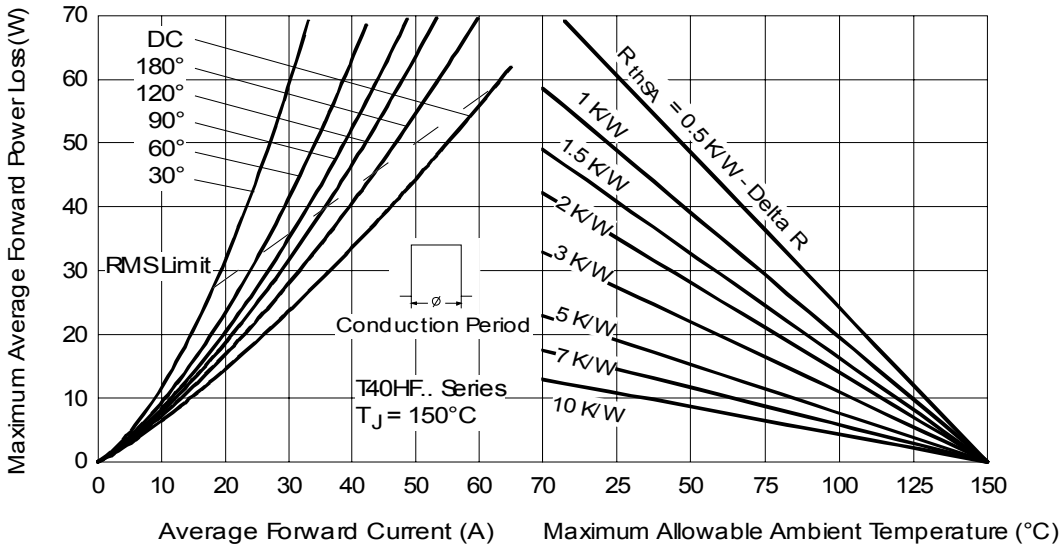



Fig. 4 - Forward Power Loss Characteristics

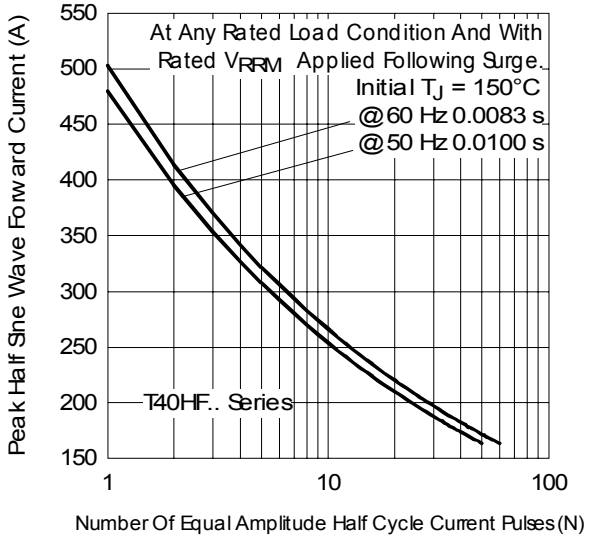



Fig. 5 - Maximum Non-Repetitive Surge Current

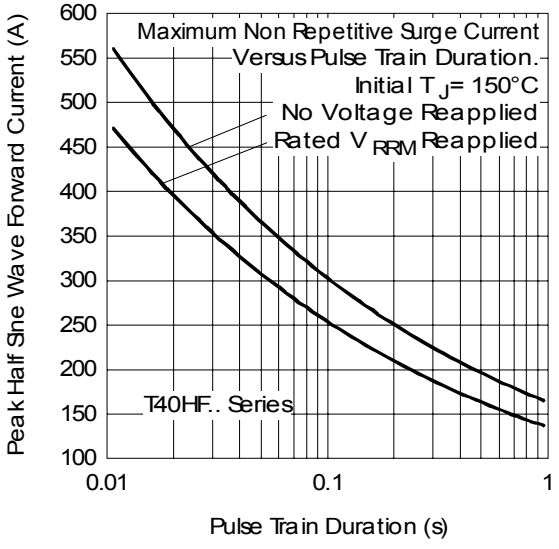



Fig. 6 - Maximum Non-Repetitive Surge Current

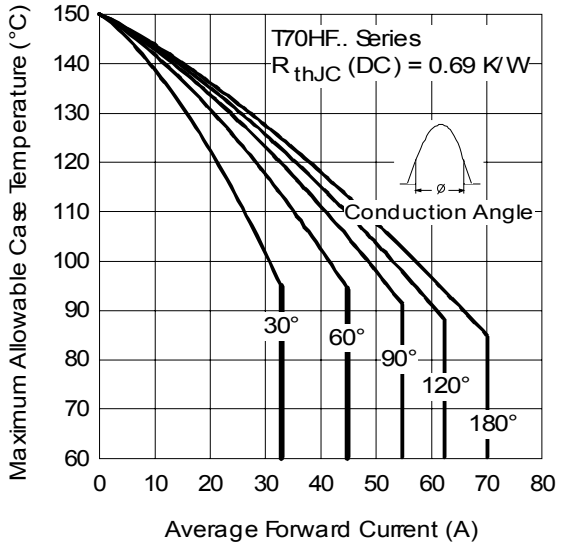



Fig. 7 - Current Ratings Characteristics

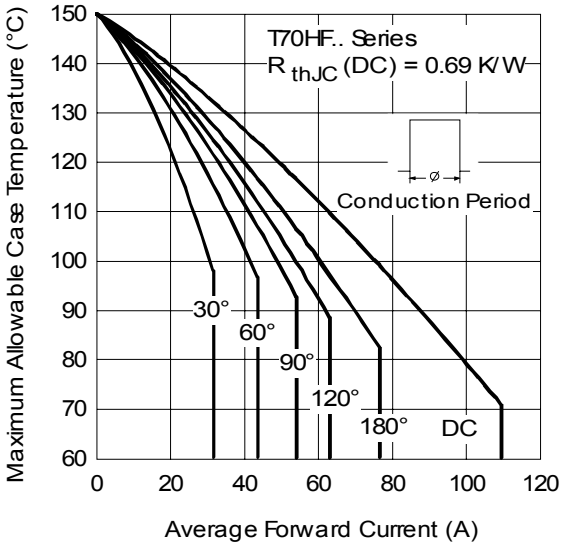



Fig. 8 - Current Ratings Characteristics

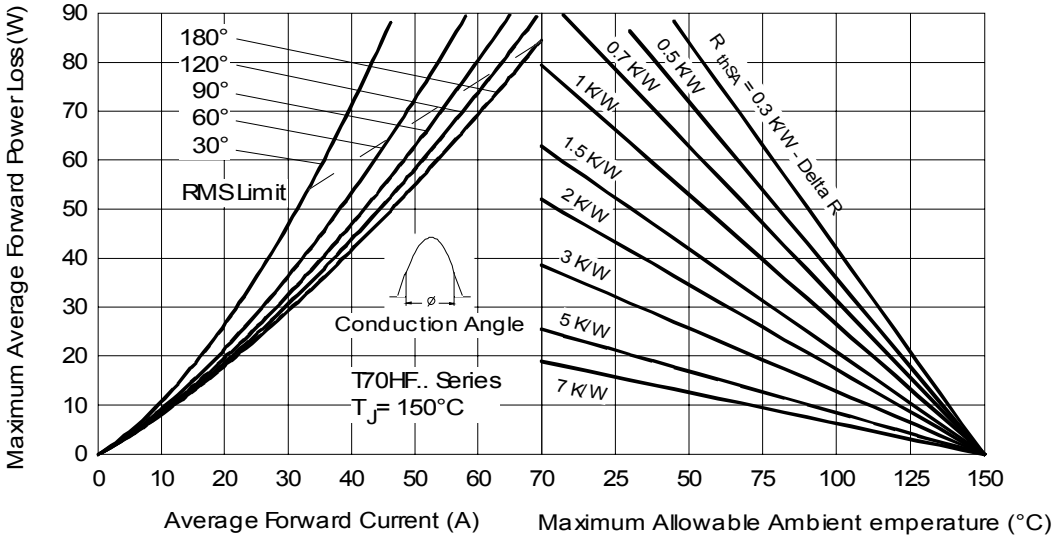



Fig. 9 - Forward Power Loss Characteristics

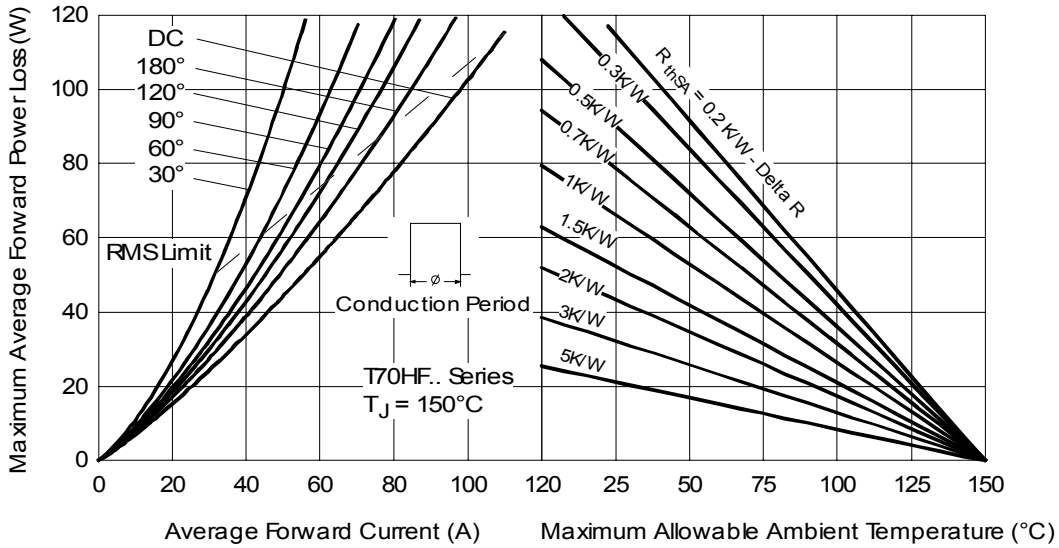



Fig. 10 - Forward Power Loss Characteristics

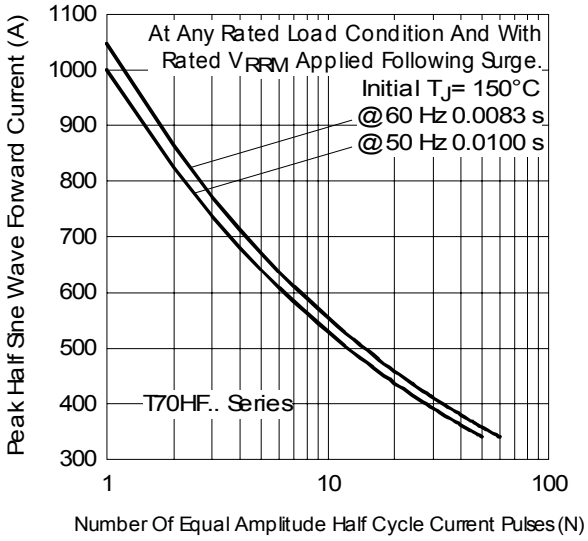



Fig. 11 - Maximum Non-Repetitive Surge Current

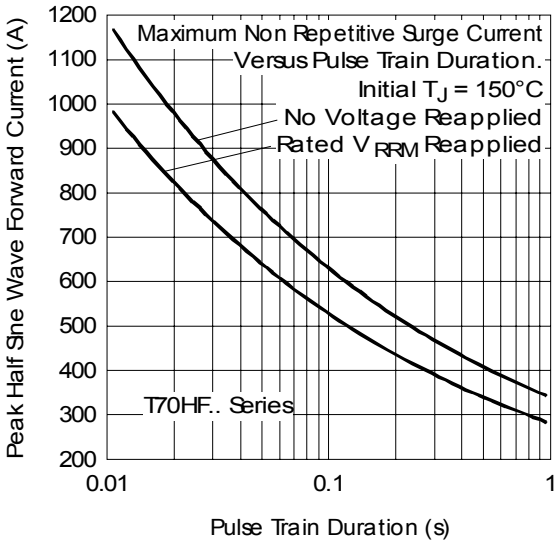



Fig. 12 - Maximum Non-Repetitive Surge Current

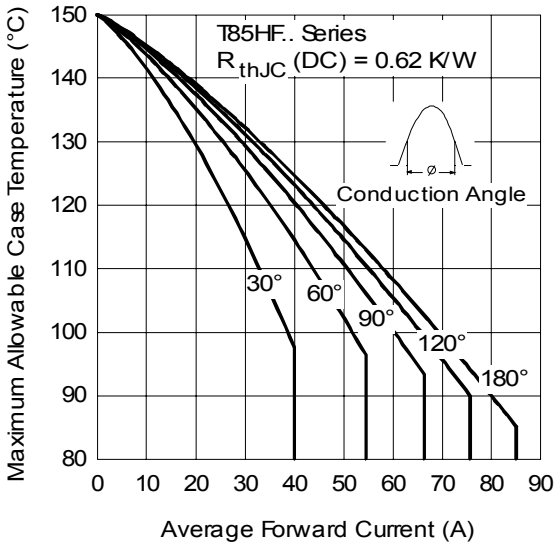



Fig. 13 - Current Ratings Characteristics

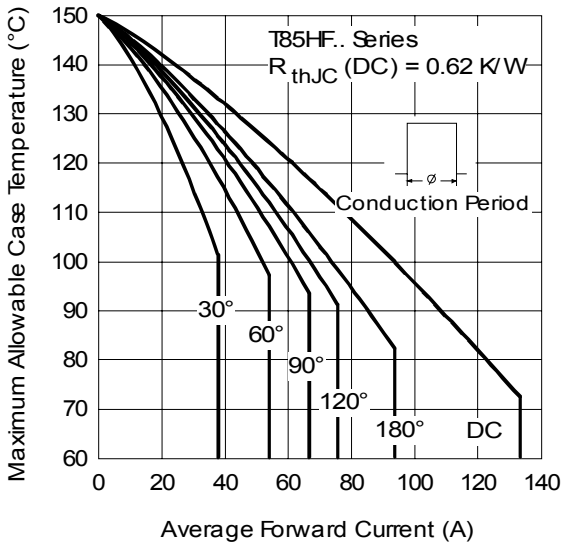



Fig. 14 - Current Ratings Characteristics

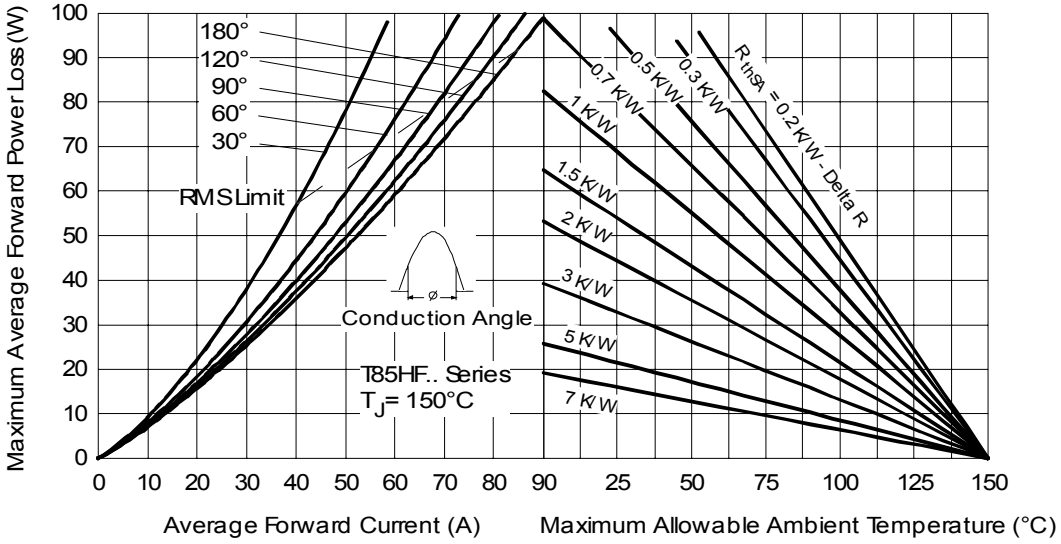



Fig. 15 - Forward Power Loss Characteristics

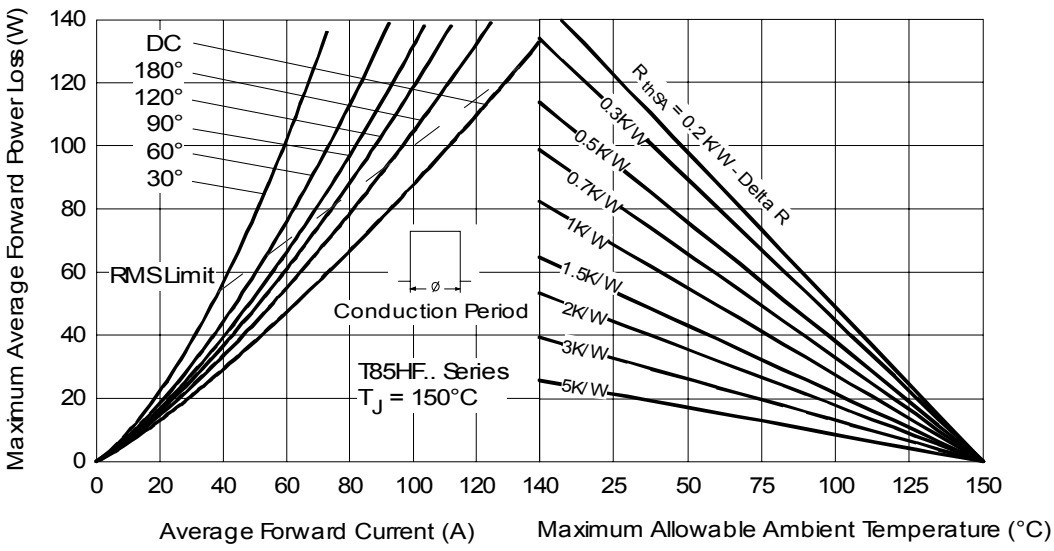



Fig. 16 - Forward Power Loss Characteristics

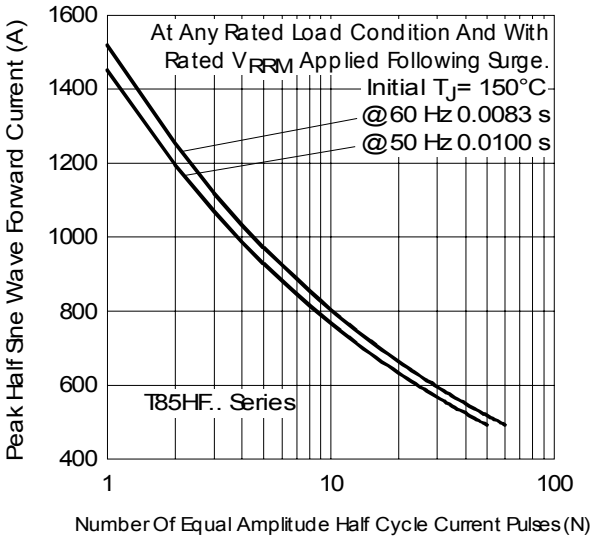



Fig. 17 - Maximum Non-Repetitive Surge Current

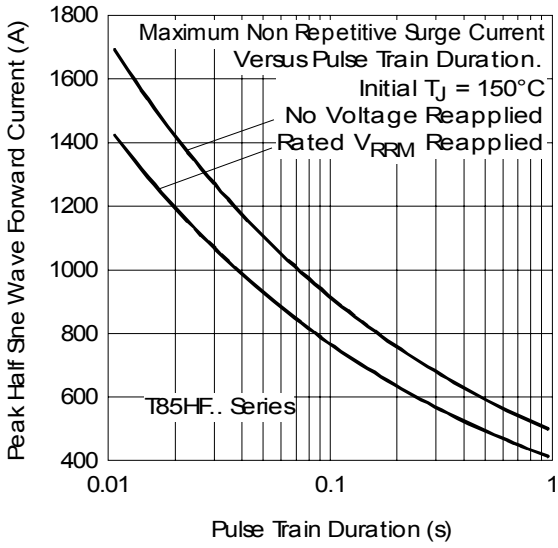



Fig. 18 - Maximum Non-Repetitive Surge Current

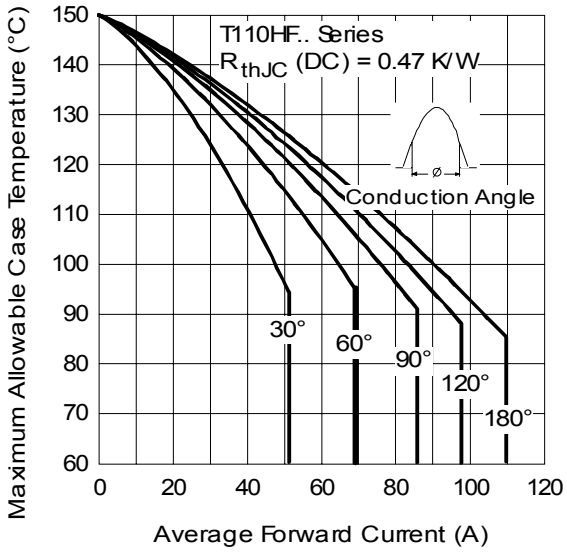



Fig. 19 - Current Ratings Characteristics

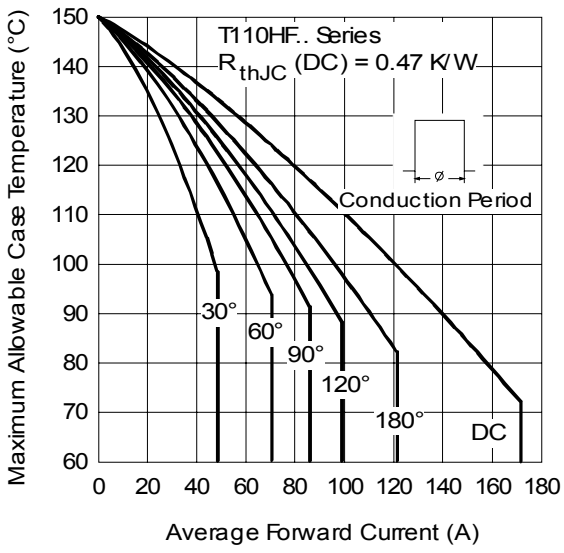



Fig. 20 - Current Ratings Characteristics

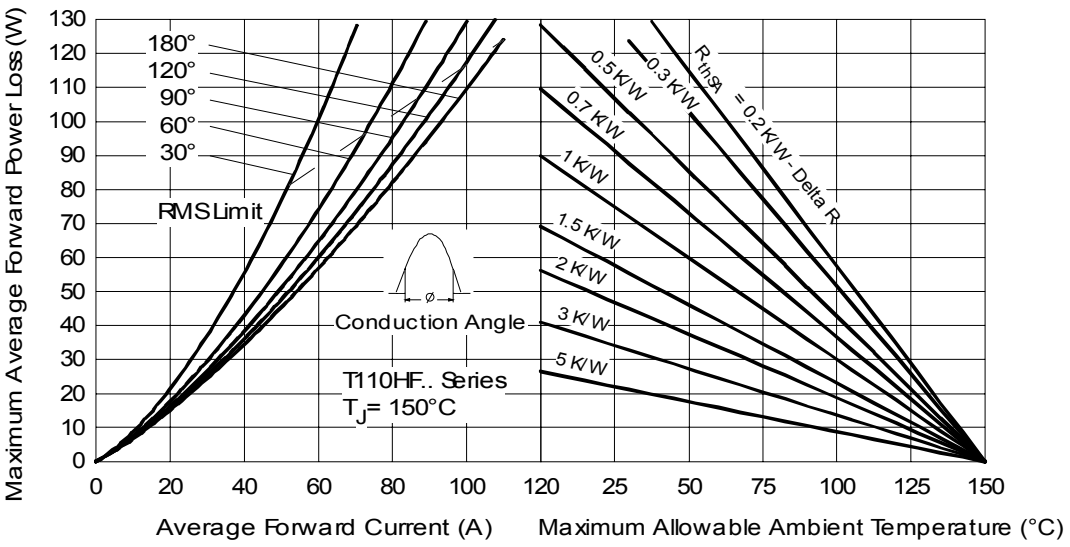



Fig. 21 - Forward Power Loss Characteristics

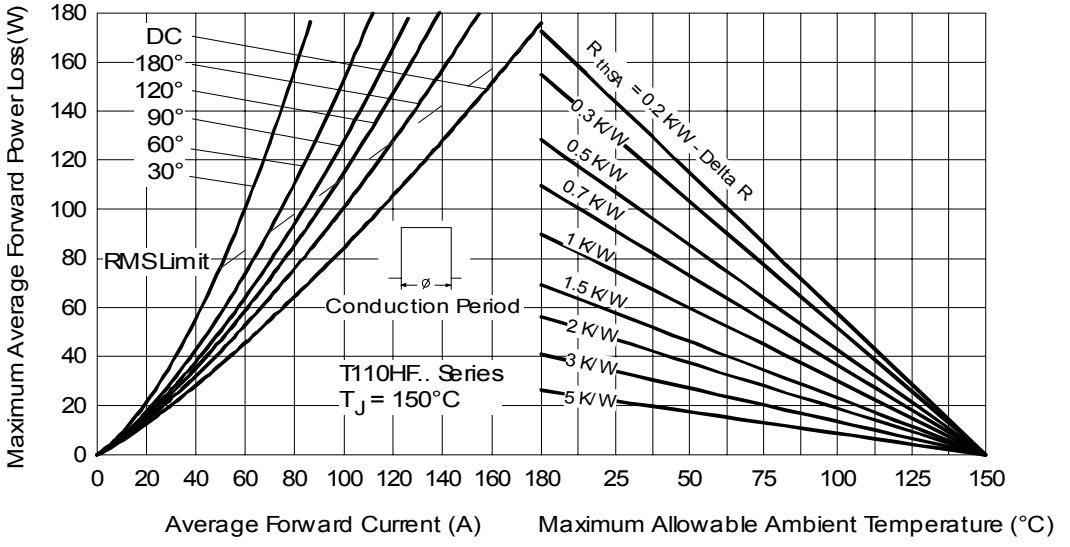



Fig. 22 - Forward Power Loss Characteristics

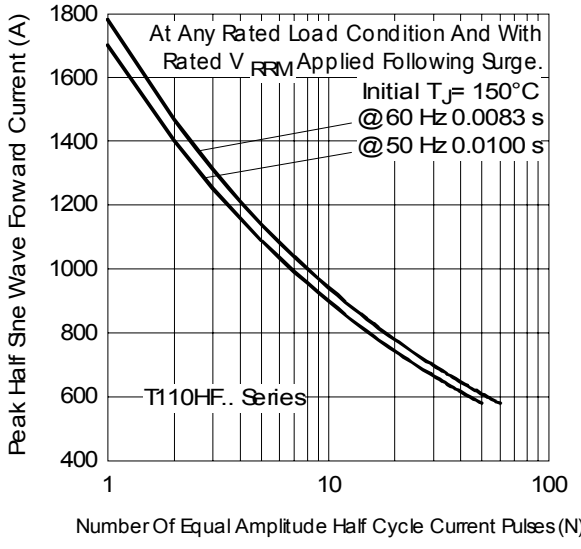



Fig. 23 - Maximum Non-Repetitive Surge Current

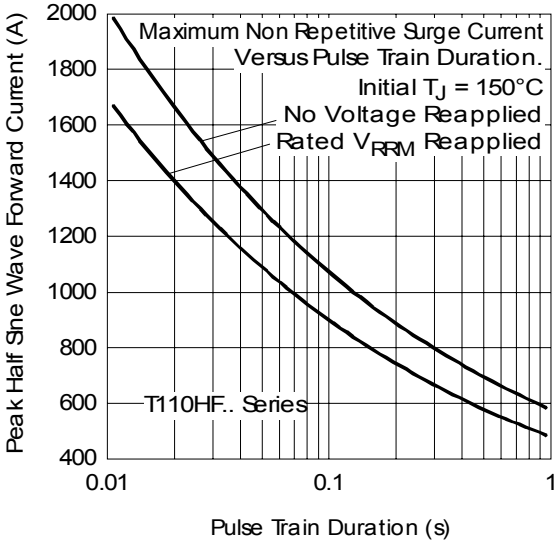



Fig. 24 - Maximum Non-Repetitive Surge Current

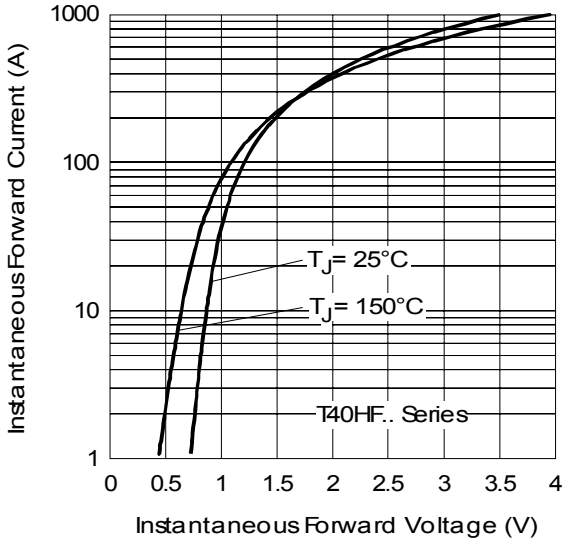



Fig. 25 - Forward Voltage Drop Characteristics

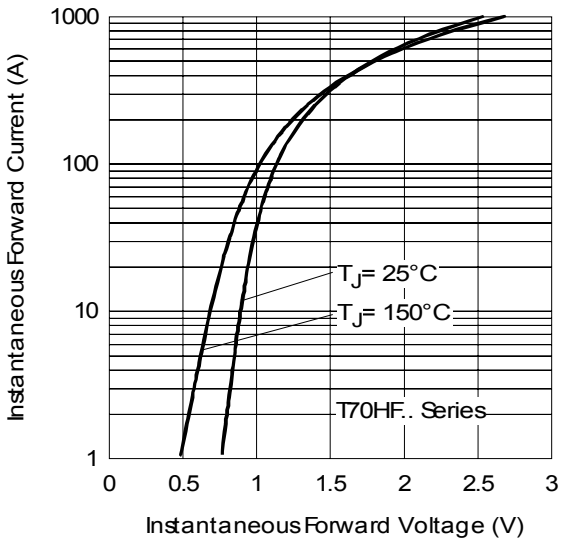



Fig. 26 - Forward Voltage Drop Characteristics

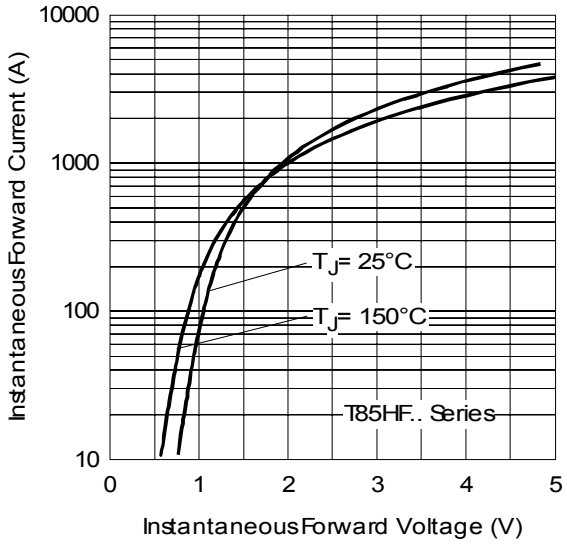



Fig. 27 - Forward Voltage Drop Characteristics

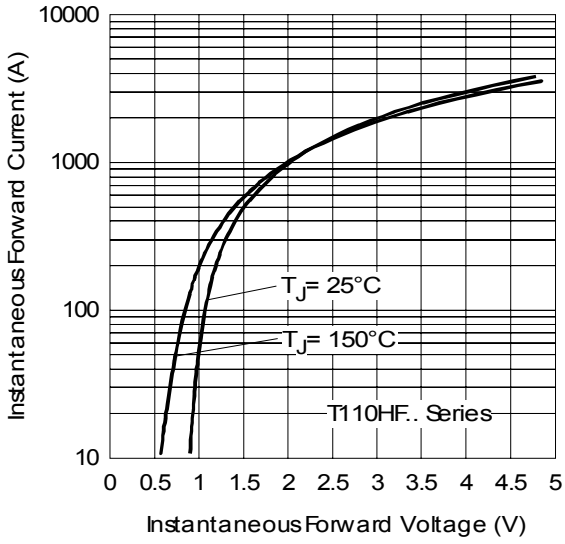



Fig. 28 - Forward Voltage Drop Characteristics

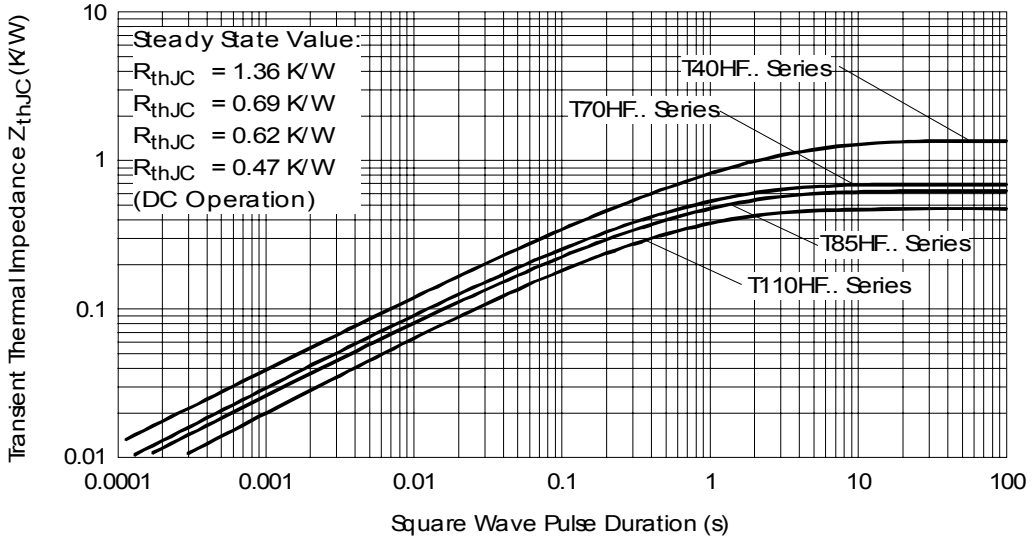



Fig. 29 - Thermal Impedance $Z_{thJC}$ Characteristics

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial Level.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

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09/06

# Notice

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