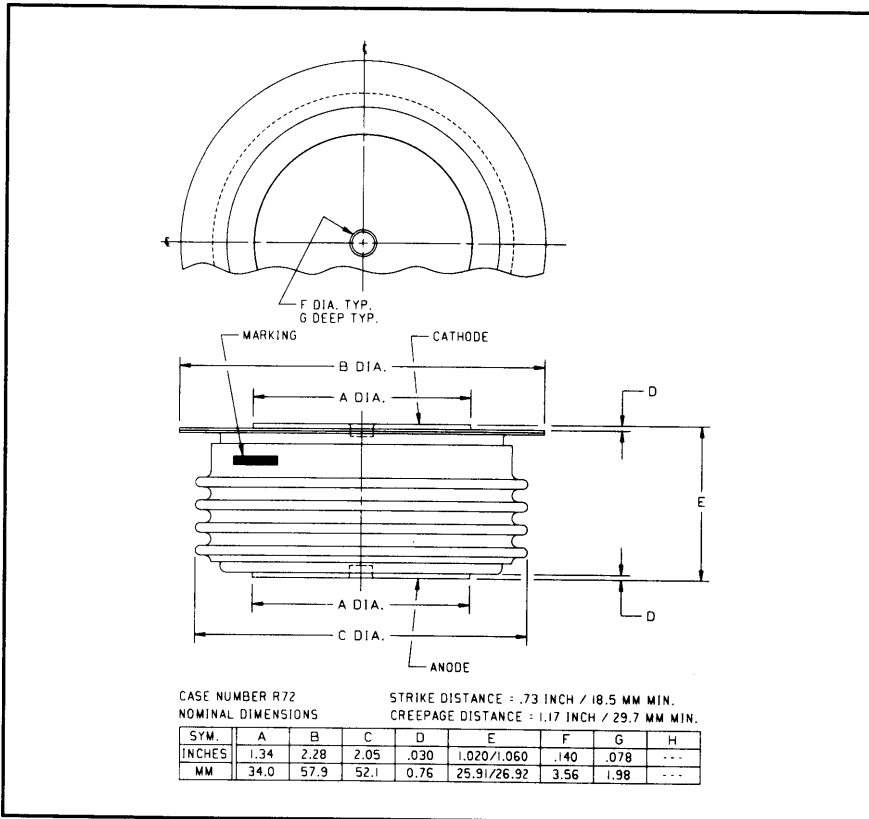
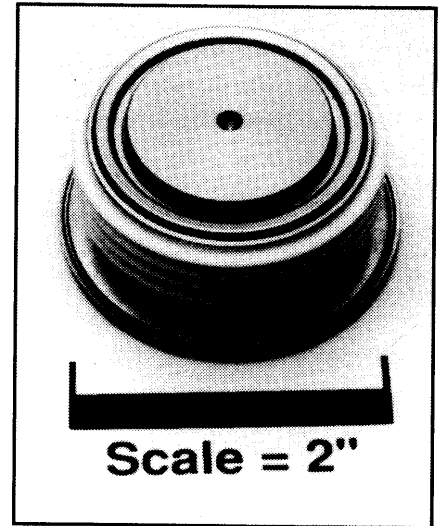


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 Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

Fast Recovery Rectifier
800 Amperes Average
1600 Volts



R722__08 (Outline Drawing)



R722__08
 Fast Recovery Rectifier
 800 Amperes Average, 1600 Volts

Ordering Information:

Select the complete part number you desire from the following table:

| Type | Voltage | | Current | | Recovery Time | | Leads | |
|------|-----------------------------|------|---------------------------|------|---------------------------|------|-------|------|
| | V _{RRM} (Volts) | Code | I _{F(av)} (A) | Code | t _{rr} (μsec) | Code | Case | Code |
| R722 | 400 | 04 | 800 | 08 | 2.0 | ES | R72 | 00 |
| | 600 | 06 | | | | | | |
| | 800 | 08 | | | | | | |
| | 1000 | 10 | | | | | | |
| | 1200 | 12 | | | | | | |
| | 1400 | 14 | | | | | | |
| | 1600 | 16 | | | | | | |

Example: Type R722 rated at 800A average with V_{RRM} = 1600V,
 Recovery Time = 2.0 μsec, order as:

| Type | Voltage | | Current | | Time | Leads | | | | |
|------|---------|---|---------|---|------|-------|---|----|---|---|
| R | 7 | 2 | 2 | 1 | 6 | 0 | 8 | ES | O | O |
| | | | | | | | | | | |

Features:

- Fast Recovery Times
- Soft Recovery Characteristics
- High Surge Current Ratings
- Special Selection of t_{rr} or Q_{rr} Available

Applications:

- Inverters
- Choppers
- Transmitters
- Free Wheeling Diode

R722_08

Fast Recovery Rectifier

800 Amperes Average, 1600 Volts

Absolute Maximum Ratings

| Characteristics | Symbol | R722_08 | Units |
|--|--------------|------------------|-------------|
| RMS Forward Current | $I_{F(rms)}$ | 1250 | Amperes |
| Average Forward Current | $I_{F(av)}$ | 800 | Amperes |
| One-half Cycle Surge Current | I_{FSM} | 11000 | Amperes |
| I^2t (for Fusing), Times = 8.3 milliseconds | I^2t | 504000 | A^2sec |
| Max. I^2t Package (for Times = 8.3 milliseconds) | I^2t | 80×10^6 | A^2sec |
| Storage Temperature | T_{stg} | -40 to +190 | $^{\circ}C$ |
| Operating Temperature | T_j | -40 to +150 | $^{\circ}C$ |
| Mounting Force | | 2000 to 2400 | lbs |

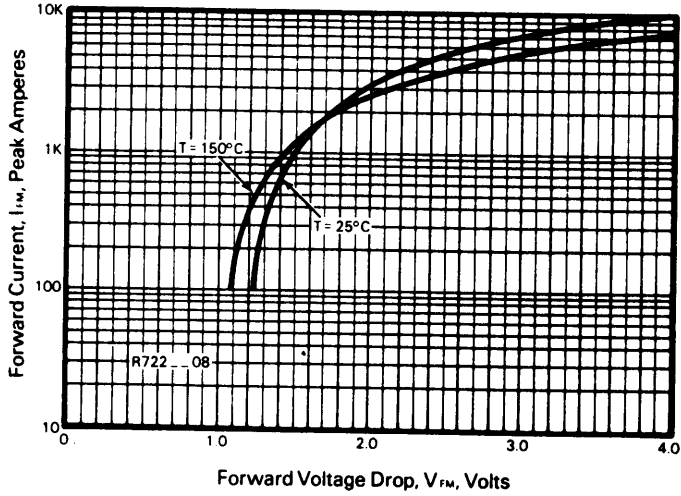
Electrical and Thermal Characteristics

| Characteristics | Symbol | Test Conditions | R722_08 | Units |
|---|-------------------|---|---------|------------------|
| Current - Conducting State Maximums | | | | |
| Forward Voltage Drop | V_{FM} | $T_j = 25^{\circ}C, I_{FM} = 1500A$ | 1.65 | Volts |
| Voltage - Blocking State Maximums | | | | |
| Repetitive Peak Reverse Voltage (Rated Limit) | V_{RRM} | | 1600 | Volts |
| Non-rep. Trans. Peak Rev. Voltage (Rated Limit) | V_{RSM} | $t \leq 5.0msec$ | 1800 | Volts |
| Reverse Leakage Current, mA peak | I_{RRM} | T_j at max., $V_{RRM} = \text{Rated}$ | 50 | mA |
| Switching | | | | |
| Maximum Reverse Recovery Time | t_{rr} | $I_{FM} = 1500A, t_p = 190\mu sec,$ $di_R/dt = 25A/\mu sec, T_C = 25^{\circ}C$ | 2.0 | μsec |
| Thermal | | | | |
| Maximum Resistance, Junction to Case | $R_{\theta(j-c)}$ | | 0.055 | $^{\circ}C/Watt$ |
| Maximum Resistance, Case to Sink (Lubricated) | $R_{\theta(c-s)}$ | | 0.020 | $^{\circ}C/Watt$ |

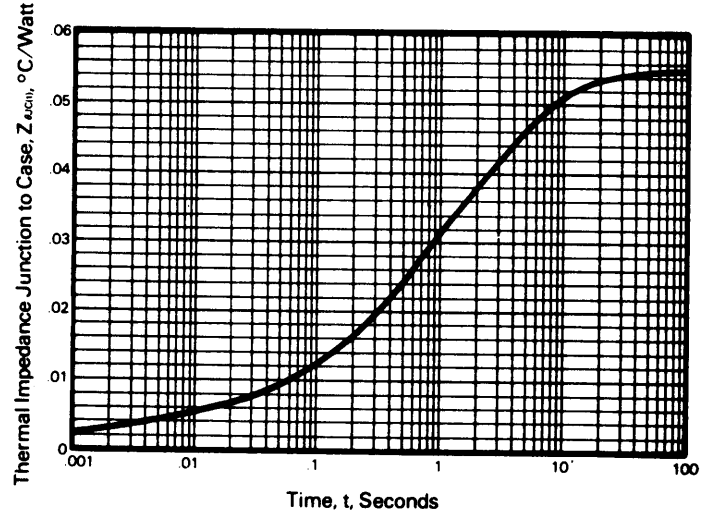
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R722_08
Fast Recovery Rectifier
 800 Amperes Average, 1600 Volts

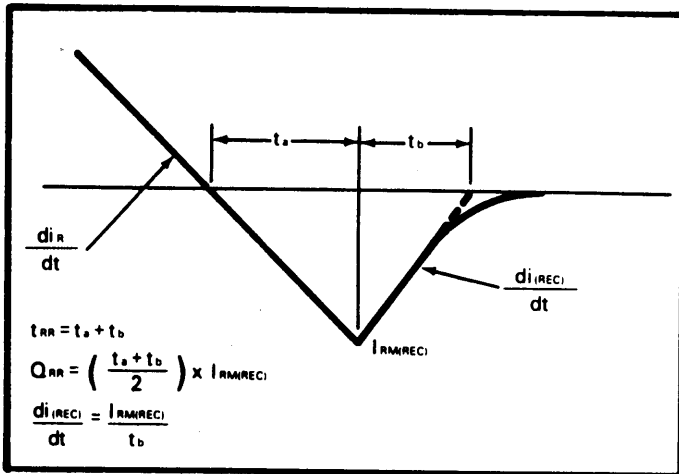
Forward Current Vs. Forward Voltage Drop



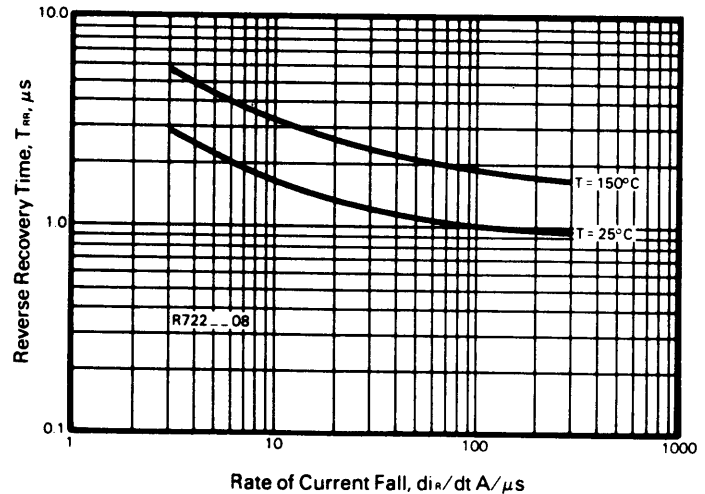
Transient Thermal Impedance Vs. Time



Reverse Recovery Wave Form



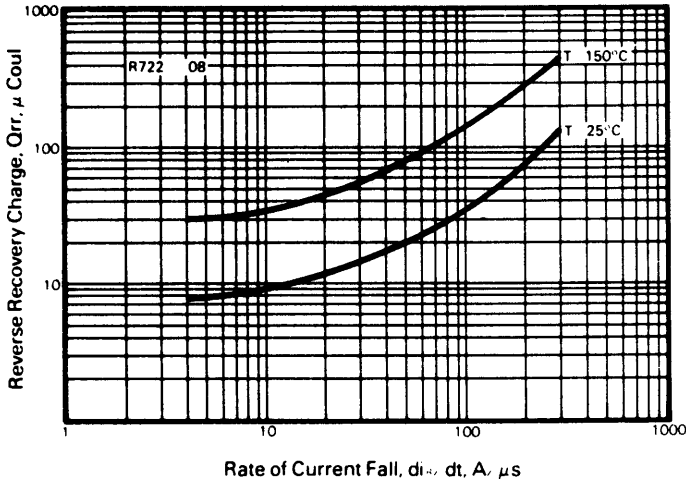
Typical Reverse Recovery Time Vs. Rate of Current Fall



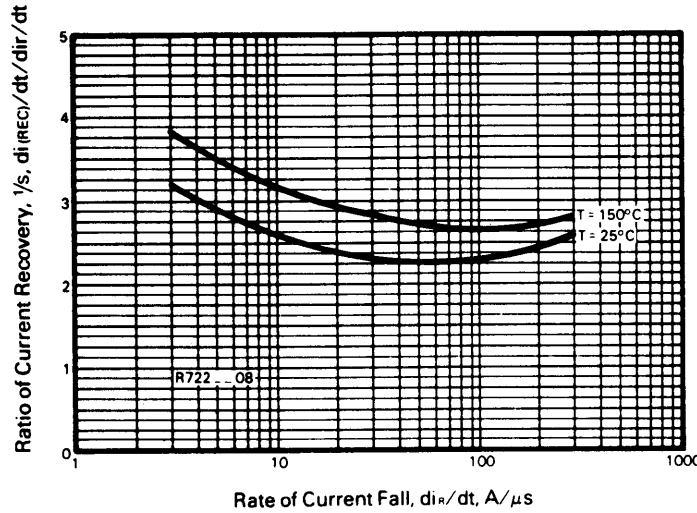
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R722_08
Fast Recovery Rectifier
 800 Amperes Average, 1600 Volts

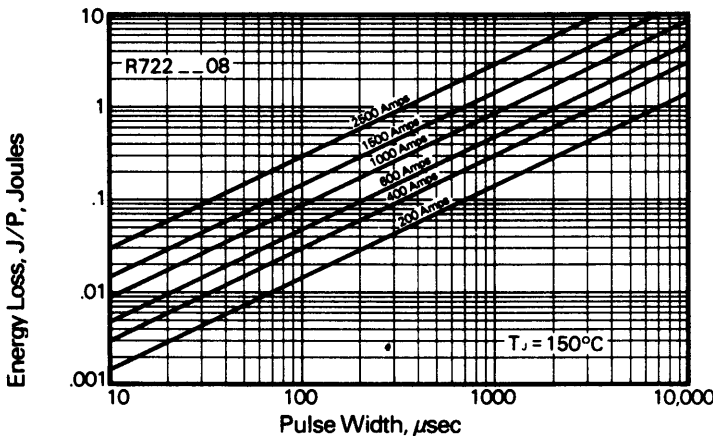
Typical Reverse Recovery Charge Vs. Rate of Current Fall



Typical Ratio of Current Recovery to Rate of Current Fall



Energy Loss Per Pulse for Sinusoidal Pulses



Calculation of Fast Recovery Diodes and Allowable Case Temperature

1. Conduction Losses

$$P_{av(cond)} = J/P \times F$$

2. Reverse Recovery Losses (Approximate)

$$P_{av(sw)} = 1/4 \times V_R \times \frac{di_R}{dt} \times T_{rr}^2 \times \left(\frac{1/s}{1 + 1/s} \right)^2 \times F \times 1 \times 10^{-6}$$

3. Maximum Allowable Case Temperature

$$T_{C(max)} = T_j - (P_{av(cond)} + P_{av(sw)} \times R_{\theta(j-c)})$$

Where:

$P_{av(cond)}$ = Forward Conduction Power Loss in Watts

$P_{av(sw)}$ = Reverse Recovery Power Loss in Watts

J/P = Energy Loss per Pulse in Joules

F = Frequency in Hertz

V_R = Steady State Reverse Operating Voltage in Volts

di_R/dt = Rate of Decay of Forward Current in Amperes/ μ sec

T_{rr} = Reverse Recovery Time in Microseconds

$\frac{1}{"S"}$ = Ratio of Recovery $di/dt \left(\frac{di_F/dt}{di_R/dt} \right)$

F = Operating Frequency in Hertz

$T_{C(max)}$ = Maximum Allowable Case Temperature in °C

T_j = Maximum Operating Junction Temperature in °C.

$R_{\theta(j-c)}$ = DC Junction to Case Thermal Impedance in °C/Watt.