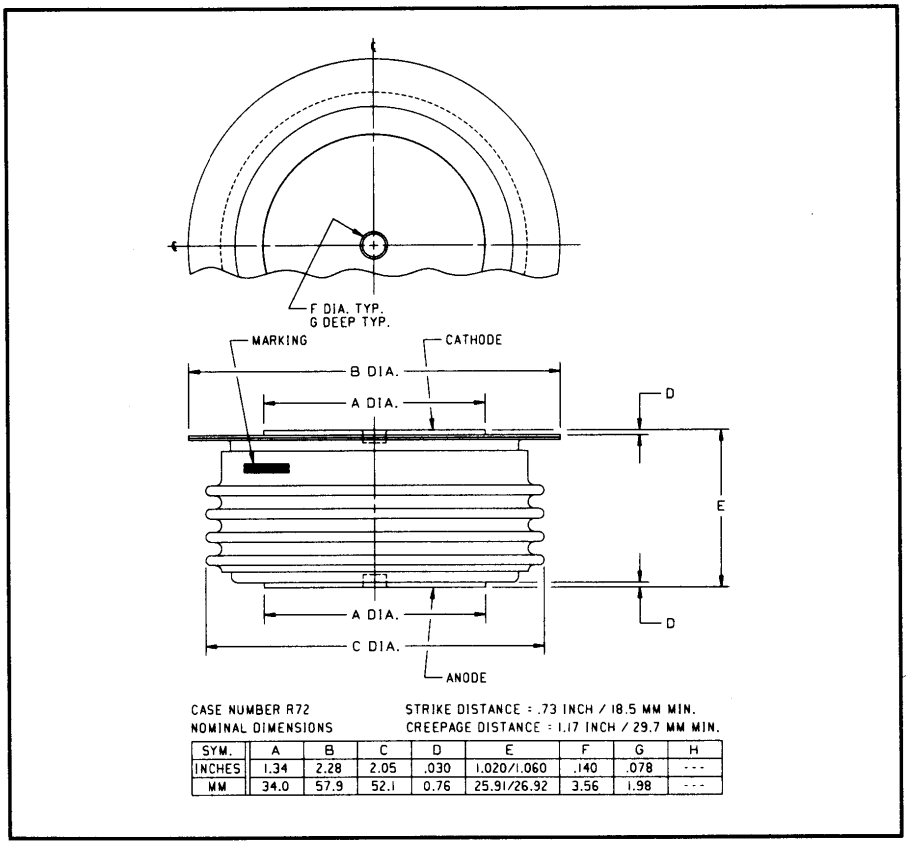
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272
Powerex, Europe, S.A. 428 Avenue G. Durand, BP107, 72003 Le Mans, France (43) 41.14.14

Fast Recovery Rectifier

500 Amperes Average
2600 Volts

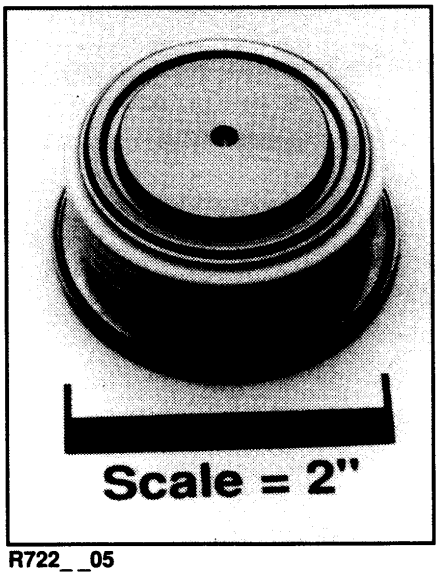


CASE NUMBER R72
NOMINAL DIMENSIONS

STRIKE DISTANCE = .73 INCH / 18.5 MM MIN.
CREEPAGE DISTANCE = 1.17 INCH / 29.7 MM MIN.

SYM.	A	B	C	D	E	F	G	H
INCHES	1.34	2.28	2.05	.030	1.020/1.060	.140	.078	---
MM	34.0	57.9	52.1	0.76	25.91/26.92	3.56	1.98	---

R722_ _05 (Outline Drawing)



R722_ _05
Fast Recovery Rectifier
500 Amperes Average, 2600 Volts

Ordering Information:

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

Type	Voltage V_{RRM} (Volts)	Code	Current $I_{F(av)}$ (A)	Code	Recovery Time t_{rr} (µsec)	Code	Leads Case	Code
R722	400	04	500	05	3.0	CS	R72	OO
	600	06						
	800	08						
	1000	10						
	1200	12						
	1400	14						
	1600	16						
	1800	18						
	2000	20						
	2200	22						
	2600	26						

Example: Type R722 rated at 500A average with V_{RRM} = 2600V, Recovery Time = 3.0 µsec, order as:

Type				Voltage		Current		Time	Leads	
R	7	2	2	2	6	0	5	CS	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

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R722_ _05
Fast Recovery Rectifier
500 Amperes Average, 2600 Volts

Absolute Maximum Ratings

Characteristics	Symbol	R722_ _05	Units
RMS Forward Current	$I_{F(rms)}$	785	Amperes
Average Forward Current	$I_{F(av)}$	500	Amperes
One-half Cycle Surge Current	I_{FSM}	6500	Amperes
I^2t (for Fusing), Times = 8.3 milliseconds	I^2t	176000	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	°C
Operating Temperature	T_j	-40 to +150	°C
Mounting Force		2000 to 2400	lbs

Electrical and Thermal Characteristics

Characteristics	Symbol	Test Conditions	R722_ _05	Units
Current - Conducting State Maximums				
Forward Voltage Drop	V_{FM}	T_j = 25°C, I_{FM} = 1500A	2.25	Volts
Voltage - Blocking State Maximums				
Repetitive Peak Reverse Voltage (Rated Limit)	V_{RRM}		2600	Volts
Non-rep. Trans. Peak Rev. Voltage (Rated Limit)	V_{RSM}	t ≤ 5.0msec	2800	Volts
Reverse Leakage Current, mA peak	I_{RRM}	T_j at max., V_{RRM} = Rated	50	mA
Switching				
Maximum Reverse Recovery Time	t_{rr}	I_{FM} = 1500A, t_p = 190µsec, di_R/dt = 25A/µsec, T_C = 25°C	3.0	µsec
Thermal				
Maximum Resistance, Junction to Case	$R_{\theta(j-c)}$		0.055	°C/Watt
Maximum Resistance, Case to Sink (Lubricated)	$R_{\theta(c-s)}$		0.020	°C/Watt

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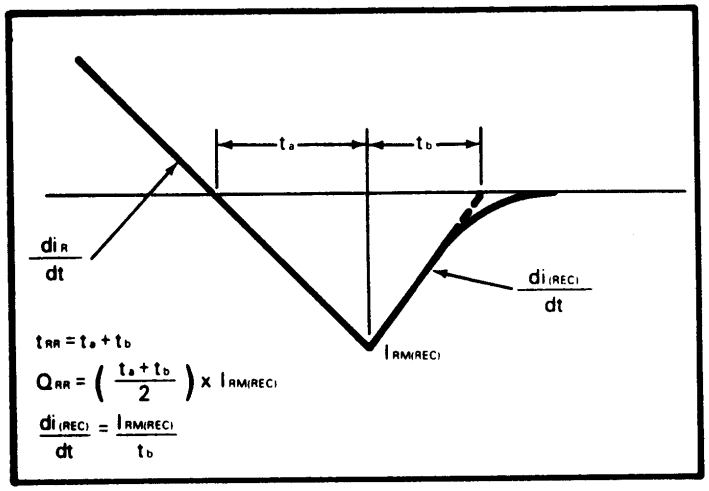
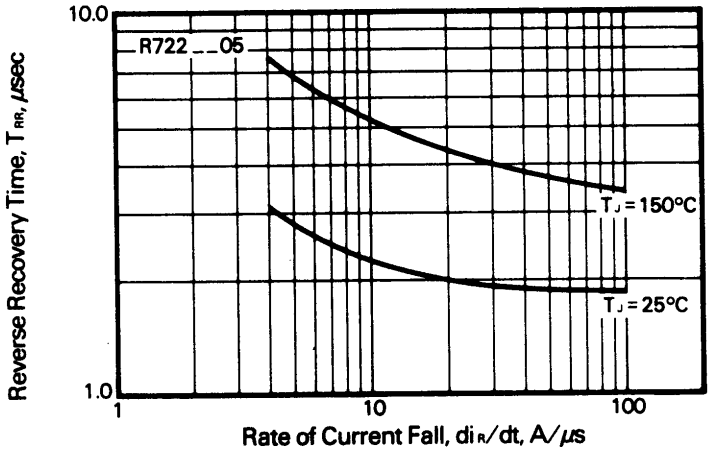
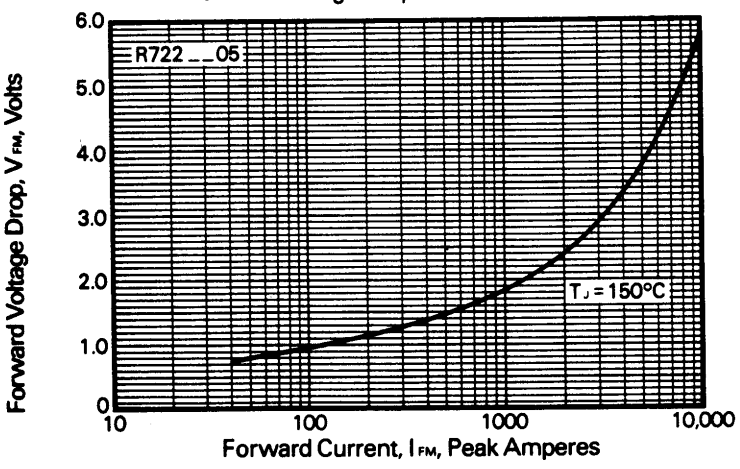
Reverse Recovery Wave Form



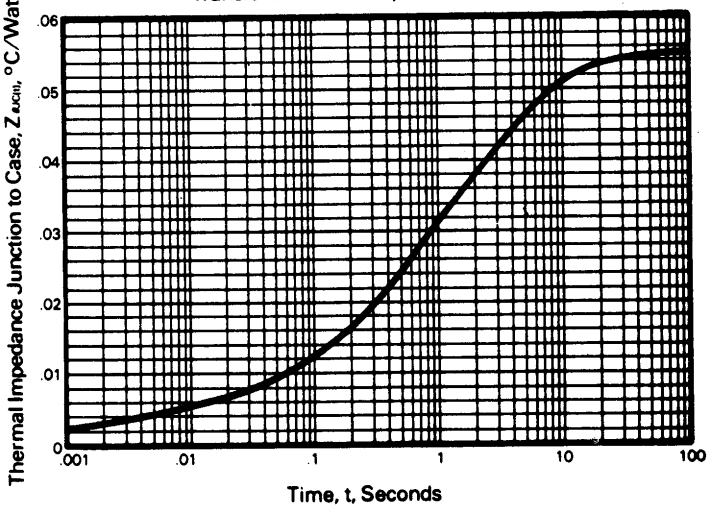
Typical Reverse Recovery Time vs. Rate of Current Fall



Forward Voltage Drop vs. Forward Current



Transient Thermal Impedance Vs. Time



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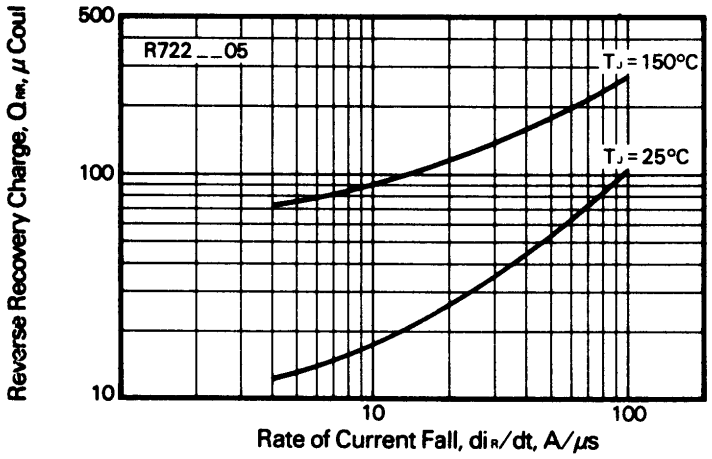
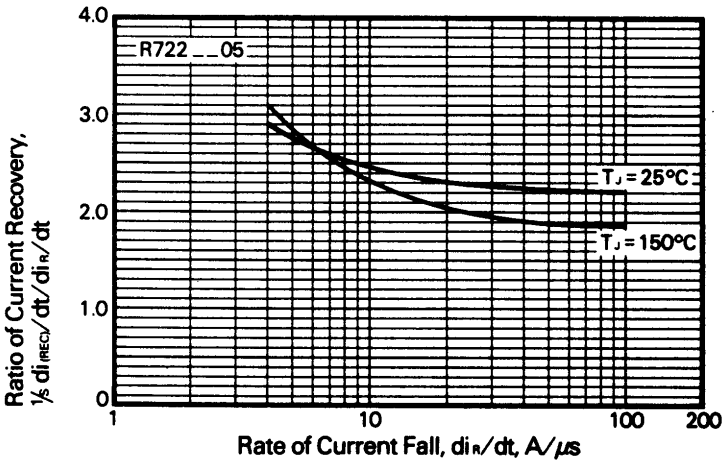
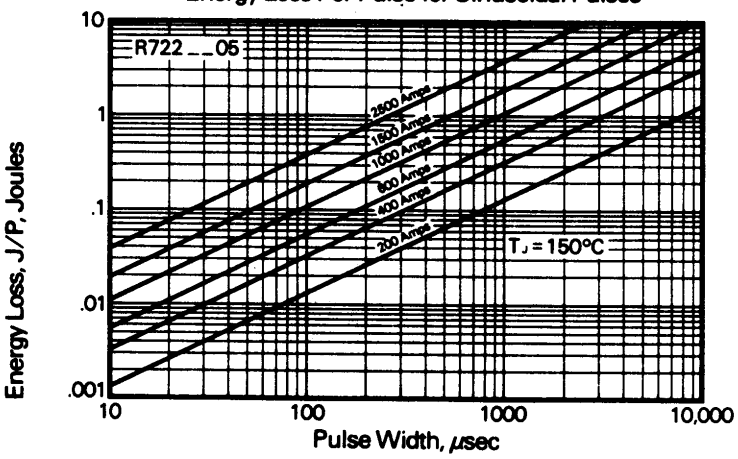
Typical Reverse Recovery Charge vs. Rate of Current Fall



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)
   $$P_{av(sw)} = 1/4 \times V_R \times \frac{di_R}{dt} \times T_{rr}^2 \times \left(\frac{1/s}{1 + 1/s}\right)^2 \times F \times 1x10^{-6}$$

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/μsec
T_{rr}	= Reverse Recovery Time in Microseconds
$\frac{1}{\text{"S"}}$	= 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.

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