



WESTCODE SEMICONDUCTORS



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Fast Recovery Stud-Base Diode Type PCN/PCR046

45 amperes average: up to 400 volts V_{RRM}

Ratings (Maximum values at T_j 150°C unless stated otherwise)

RATING	CONDITIONS	SYMBOL	
Average forward current	Half sinewave 100°C case temperature	$I_{F(AV)}$	45A
R.M.S. current		$I_{F(RMS)}$	118A
D.C. forward current		I_F	118A
Peak one-cycle surge non-repetitive	10m.s. sine pulse $\left\{ \begin{array}{l} 60\% V_{RRM} \text{ re-applied max.} \\ V_{RM} \leq 10 \text{ Volts} \end{array} \right.$	$I_{FSM} (1)$ $I_{FSM} (2)$	650A 750A
Maximum surge I^2t	10m.s. sine pulse $\left\{ \begin{array}{l} 60\% V_{RRM} \text{ re-applied max.} \\ V_{RM} \leq 10 \text{ Volts} \end{array} \right.$ 3m.s. sine pulse $V_{RM} \leq 10 \text{ volts}$	$I^2t (1)$ $I^2t (2)$ $I^2t (3)$	2113A ² s 2800A ² s 2080A ² s
Operating temperature range		T_{case}	-55 + 150°C
Storage temperature range		T_{stg}	-55 + 150°C

Characteristics (Maximum values at T_j 150°C unless stated otherwise)

CHARACTERISTIC	CONDITIONS	SYMBOL	
Peak forward voltage drop	At 135A I_{FM}	V_{FM}	1.56V
Forward conduction threshold voltage		V_O	1.15V
Forward conduction slope resistance		r	3.05mΩ
Peak reverse current	$V_{RM} = V_{RRM} \text{ (max.)}$	I_{RRM}	15mA
Thermal resistance	Junction to case	$R_{th(j-c)}$	0.8°C/W
	Case to heatsink	$R_{th(c-hs)}$	0.1°C/W
Reverse recovered charge	$\left\{ \begin{array}{l} I_{FM} = 100A, di/dt = 25 A/\mu s \\ V_{RM} = 50V \end{array} \right.$	Q_{rr}	4.5μC
Reverse recovery time		t_{rr}	0.9μS

VOLTAGE CODE	02	04				
*Repetitive voltage V_{RRM}	200	400				
Non-repetitive voltage V_{RSM}	300	500				

*Maximum heatsink to free air thermal resistance for which repetitive voltage ratings apply is 7.5°C/W

Ordering Information (Please quote device code as explained below — 10 digits)

S	M	● ●	P	C	●	0	4	6
FIXED BASIC CODE	VOLTAGE CODE (see above)		FIXED OUTLINE CODE		BASE POLARITY N = cathode R = anode		FIXED TYPE CODE	

Typical code: SM04PCN046 = 400 V_{RRM} stud-base diode with stud cathode

NOTES ON OPERATION

1. For rectangular wave operation, allowance must be made with regard to the maximum permissible case temperature for both the heating caused by the average reverse switching dissipation and the rise in junction temperature per reverse power pulse. Failure to correct for both average and peak temperature rises could result in the failure of the device to withstand the full reverse voltage which is assumed to be applied at the instant of junction recovery.

Allowance may be made for average and peak reverse switching power dissipation as follows:

$$T_{CASE(2)} = T_{CASE(1)} - (E/\text{pulse/volt}) \cdot f \cdot V_{RRM} R_{th(J-C)} - \Delta T_J/\text{volt} V_{RRM}$$

where: $T_{CASE(1)}$ is the maximum permissible case temperature for zero reverse losses.

$T_{CASE(2)}$ is the maximum permissible case temperature when allowance for reverse

switching losses has been made.

$E/\text{pulse/volt}$ is the reverse energy (in joules) in the recovery period per volt of reverse applied voltage.

f is the frequency of operation in Hz

V_{RRM} is the repetitive peak reverse voltage

$\Delta T_J/\text{volt}$ is the junction temperature rise in deg. C per volt of reverse applied voltage per reverse recovery pulse

$R_{th(J-C)}$ is 0.8°C/W

2. For sinusoidal operation, the same derating expression may be used, and will offer a considerable safety factor. The commutation rate of forward current may be taken as that obtaining at the instant at which the forward current passes through zero.

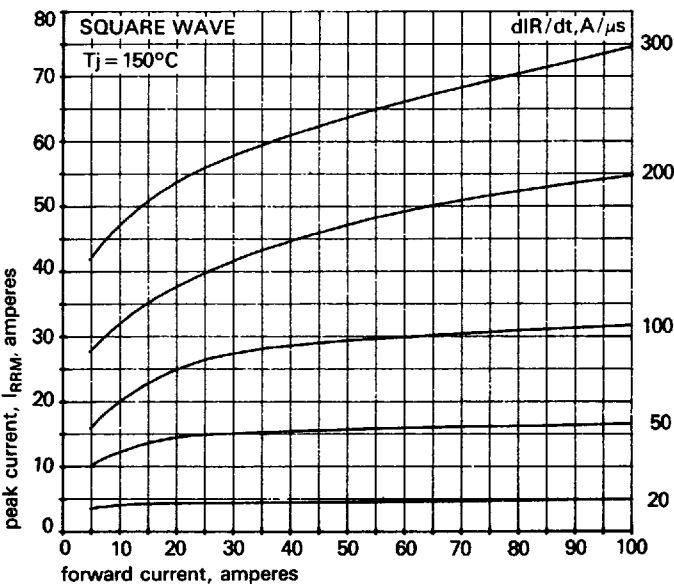
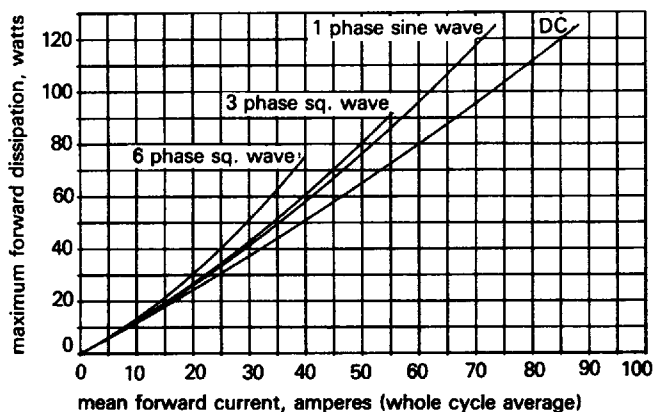
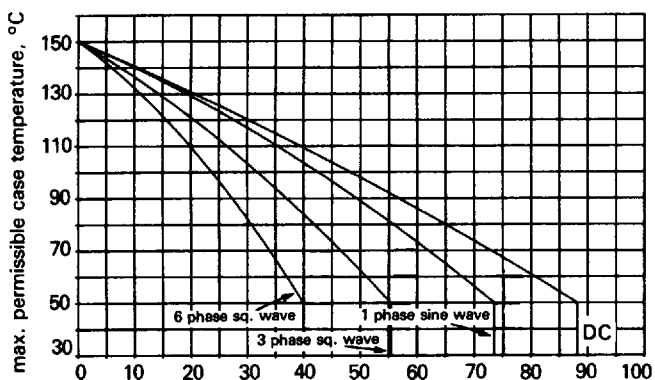


Figure 2. Maximum peak reverse recovery current v. forward current

Figure 1. Dissipation and case temperature v. current, 50Hz

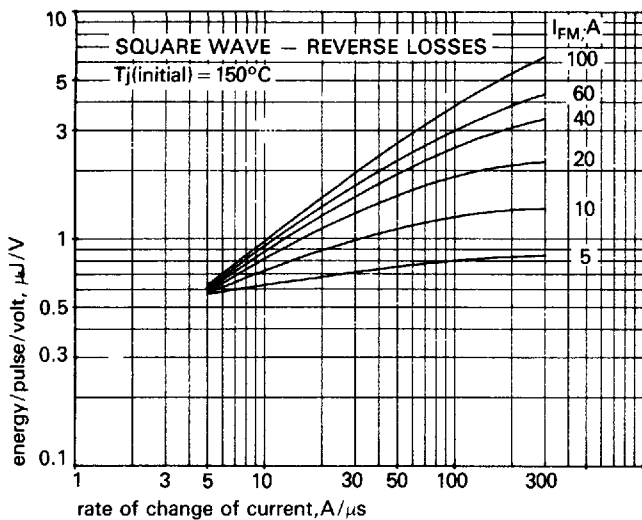


Figure 3. Max. energy/pulse/volt v. rate of change of reverse current

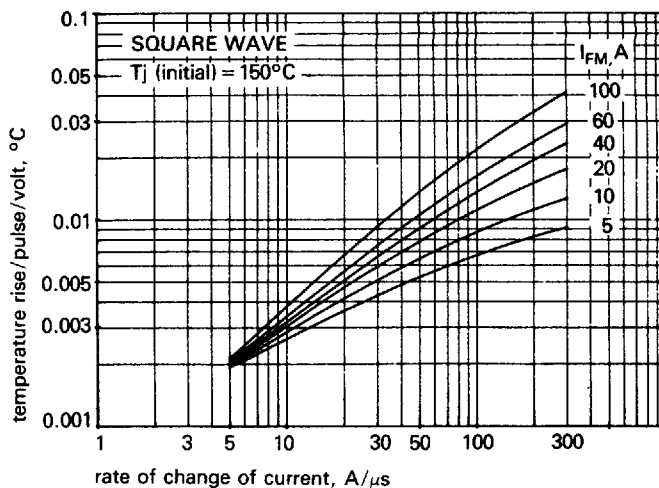


Figure 4. Junction temperature rise/pulse/volt v. rate of change of reverse current

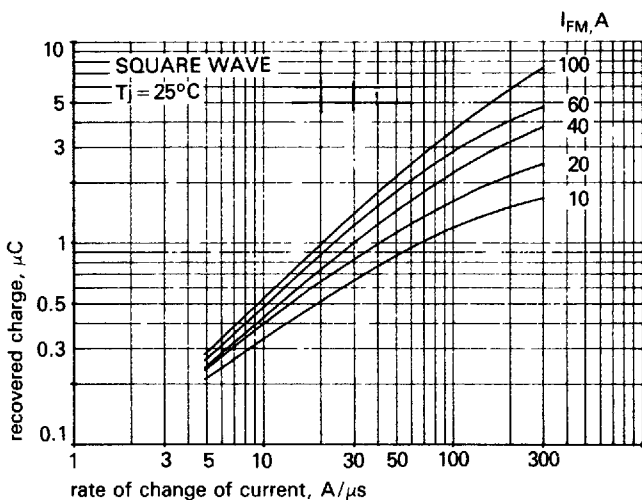


Figure 5. Max. recovered charge v. rate of change of current

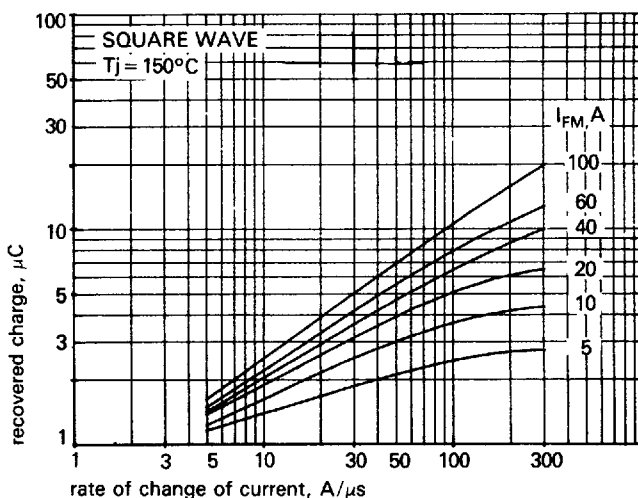


Figure 6. Max. recovered charge v. rate of change of current

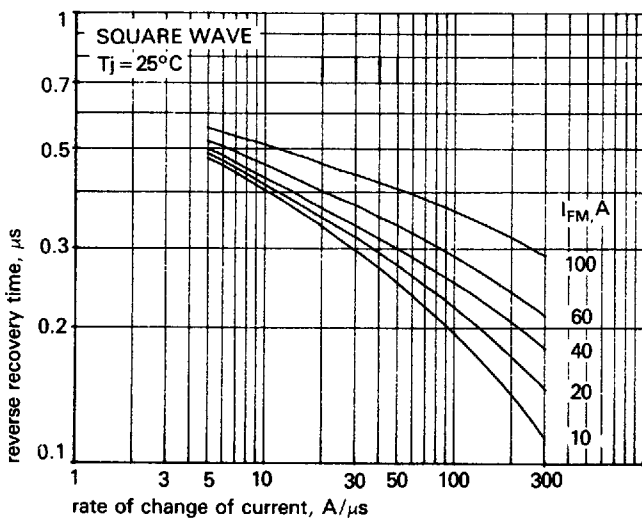


Figure 7. Max. reverse recovery time v. rate of change of current

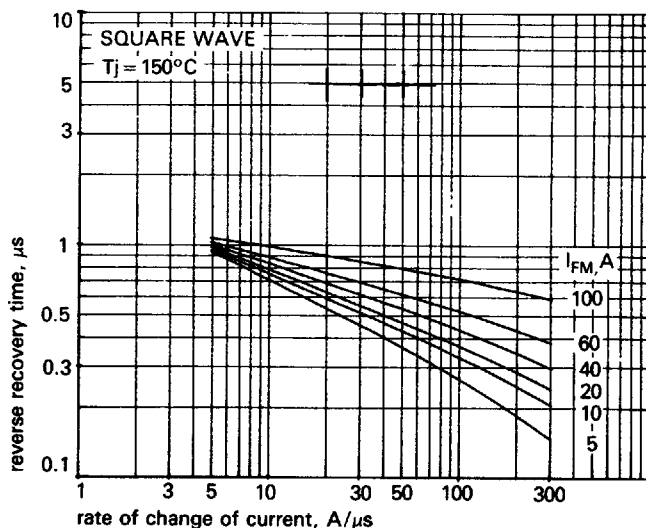


Figure 8. Max. reverse recovery time v. rate of change of current

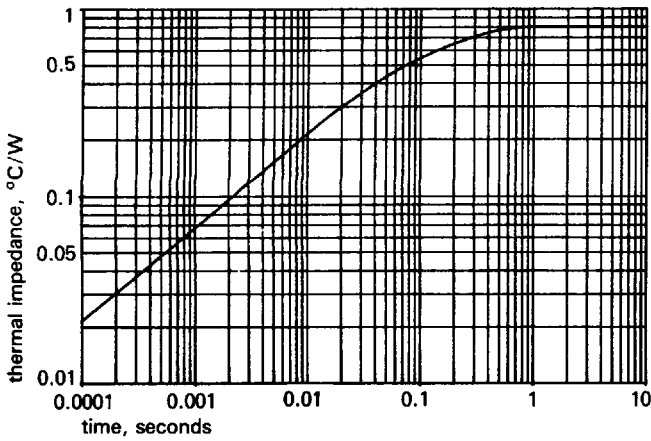


Figure 9. Junction to case transient thermal impedance

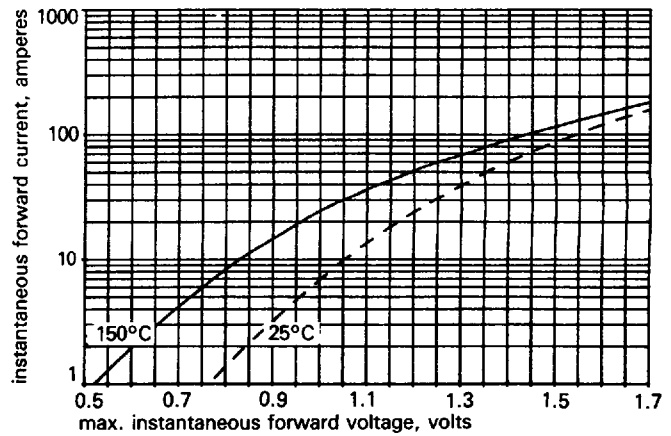


Figure 10. Forward voltage characteristic of limit diode

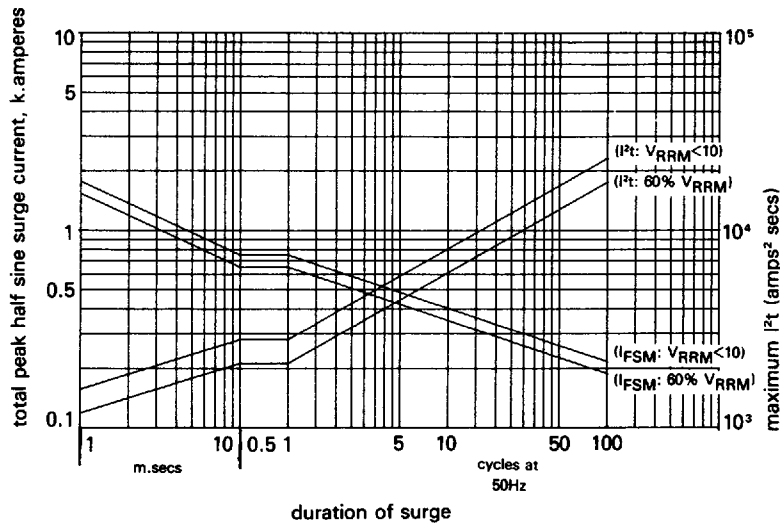
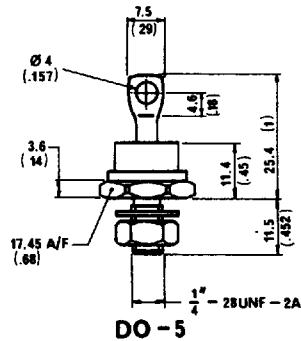


Figure 11. Max. non-repetitive surge current at initial junction temperature 150°C



Dimensions in m.m. (inches)

Mounting torque:
4–4.7 Nm (0.4–0.48 Kgf m)
Threads not to be lubricated
Weight: 20 grams

In the interest of product improvement, Westcode reserves the right to change specifications at any time without notice.



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