Rectifier Diode
Types W0507YH360 to W0507YH450

The data sheet on the subsequent pages of this document is a scanned copy of existing data for this product.
(Rating Report 96D04 Issue 2)

This data reflects the old part number for this product which is: SW36-45HXC270. This part number must **NOT** be used for ordering purposes – please use the ordering particulars detailed below.

The limitations of this data are as follows:
No reverse recovery information available

Please use the following link to view an up to date outline drawing for this device
Outline W3

Where any information on the product matrix page differs from that in the following data, the product matrix must be considered correct

An electronic data sheet for this product is presently in preparation.

For further information on this product, please contact your local ASM or distributor.

Alternatively, please contact Westcode as detailed below.

Ordering Particulars

W0507	YH	♦♦	**0**
Fixed Type Code	Fixed Outline Code	Voltage code V_{RRM}/100 36-45	Fixed Code

Typical Order Code: W0507YH380, 26.6mm clamp height, 3800V V_{RRM}

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QUALITY AND EVALUATION LABORATORY

Rating Report No: 96D04 Issue 2 Date: 17th March, 1999

Origin: PAR99009 Pages: 11

Capsule Diode Type SW36-45HXC270

Author: W. Findlay Checked: Approved:

1. Abstract

The HXC270 rectifier diode features a 30mm diameter silicon slice (manufacturing reference DANXH) mounted in a cold weld capsule.

Summary of changes to previous issue.	
Issue 1	Advance Data
Issue 2	Full Rating

2. Contents

3. Introduction

The HXC270 rectifier diode features a 30mm diameter silicon slice mounted in a cold weld capsule.

WESTCODE SEMICONDUCTORS

Date :- March 99
Rat. Rep:- 96D04
Issue:- 2

Capsule Diode
Types SW36-45HXC270

4.0 Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{RRM}	Repetitive peak reverse voltage, (note 1).	3600-4500	V
V_{RSM}	Non-repetitive peak reverse voltage, (note 1).	3700-4600	V

	RATINGS	MAXIMUM LIMITS	UNITS
$I_{F(AV)}$	Mean on-state current, Tsink=55℃, (note 2).	505	A
$I_{F(AV)}$	Mean on-state current. Tsink=100℃, (note 2).	345	A
$I_{F(AV)}$	Mean on-state current. Tsink=100℃, (note 3).	210	A
$I_{F(RMS)}$	Nominal RMS on-state current, 25℃, (note 2).	935	A
$I_{F(d.c.)}$	D.C. on-state current, 25℃, (note 5).	805	A
I_{FSM}	Peak non-repetitive surge t_P=10ms, V_{RM}=0.6V_{RRM}, (note 4).	7600	A
I_{FSM2}	Peak non-repetitive surge t_P=10ms, V_{RM}≤10V, (note 4).	8200	A
I^2t	I^2t capacity for fusing t_P=10ms, V_{RM}=0.6V_{RRM}, (note 4).	289×10^3	A^2s
I^2t	I^2t capacity for fusing t_P=10ms, V_{RM}≤10V, (note 4).	336×10^3	A^2s
T_{HS}	Operating temperature range.	-40 to +160	℃
T_{stg}	Storage temperature range.	-55 to +160	℃

Notes:
1) De-rating factor of 0.13% per ℃ is applicable for T_j below 25℃.
2) Double side cooled, single phase; 50Hz, 180° half-sine wave.
3) Single side cooled, single phase; 50Hz, 180° half-sine wave.
4) Half-sinewave, 160℃ T_j initial.
5) Double Side Cooled.

5.0 Characteristics

	CHARACTERISTICS	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V_{FM}	Maximum peak forward voltage.	-	-	1.50	I_F=635A.	V
V_0	Threshold voltage.	-	-	0.97		V
r_S	Slope resistance.	-	-	0.88		mΩ
I_{RRM}	Peak reverse current.	-	-	30	Rated V_{RRM}	mA
R_θ	Thermal resistance junction to sink.	-	-	0.1	Double side cooled.	℃/W
		-	-	0.2	Single side cooled.	℃/W
F	Mounting force.	3.3	-	5.5		kN
W_t	Weight.	-	140	-		g

Notes:-

1) Unless otherwise indicated T_j=160°C.

6.0 Notes on ratings and characteristics

6.1 Voltage grade table

Voltage Grade 'H'	V_{RRM} V	V_{RSM} V	V_R D.C.
36	3600	3700	1900
38	3800	3900	1950
40	4000	4100	2000
42	4200	4300	2040
44	4400	4500	2080
45	4500	4600	2100

6.2 Extension of voltage grades

This report is applicable to other and higher voltage grades when supply has been agreed by Sales/Production.

6.3 De-rating factor

A blocking voltage de-rating factor of 0.13% per deg Celsius is applicable to this device for Tj below 25℃.

6.4 Computer modelling parameters

6.4.1 Device dissipation calculations

$$I_{AV} = \frac{-V_o + \sqrt{V_o^{\,2} + 4 * ff^{\,2} * r_s * W_{AV}}}{2 * ff^{\,2} * r_s}$$

Where V_O= 0.97 V, r_S=0.88 mΩ

$$W_{AV} = \frac{\Delta T}{R_{th}} \qquad \Delta T = t_{jMax} - t_{HS}$$

R_{th} = Supplementary thermal impedance, see table below.

ff = Form factor, see table below.

Supplementary Thermal Impedance				
Conduction Angle	6 phase (60°)	3 phase (120°)	Half wave (180°)	d.c.
Square wave Double Side Cooled	0.130	0.117	0.110	0.1
Square wave Single Side Cooled	0.230	0.217	0.210	0.2
Sine wave Double Side Cooled	0.117	0.108	0.103	
Sine wave Single Side Cooled	0.217	0.208	0.203	

Form Factors				
Conduction Angle	60^o	120^o	180^o	d.c.
Square wave	2.45	1.73	1.41	1
Sine wave	2.78	1.88	1.57	

6.4.2 ABCD Coefficients

The on-state characteristic I_F vs. V_F is represented in two ways; (i) the well established V_o and r_s tangent used for rating purposes and (ii) a set of constants A, B, C, D, forming the coefficients of the representative equation for V_F in terms of I_F given as:

$$V_F = A + B.\ln(I_F) + C.(I_F) + D.\sqrt{I_F}$$

The constants, derived by curve fitting software, are given in this report for both hot and cold characteristics where possible. The resulting values for V_F agree with the true device characteristic over a limited current range which is generally that over which the curve is plotted.

160℃ Coefficients		25℃ Coefficients	
A	0.2587428	A	0.6783057
B	0.1185595	B	0.03467407
C	8.401342×10^{-4}	C	4.695493×10^{-4}
D	-2.233814×10^{-3}	D	7.388426×10^{-3}

6.4.3 Thermal impedance calculations

$$r_t = \sum_{p=1}^{p=n} r_p \left(1 - e^{-\frac{t}{\tau_p}}\right)$$

Where p = 1 to n, n is the number of terms in the series.

t = Duration of heating pulse in seconds.

r_t = Thermal resistance at time t.

r_p = Amplitude of pth term.

τ_p = Time Constant of pth term.

D.C. Double Sided Cooled				
Term	1	2	3	4
r_p	0.04766233	0.03243763	9.409791×10^{-3}	9.611571×10^{-3}
τ_p	1.066889	0.1235431	0.03840402	3.538193×10^{-3}

D.C. Single Side Cooled					
Term	1	2	3	4	5
r_p	0.1366152	0.0151329	0.0383066	8.577754×10^{-3}	6.230917×10^{-3}
τ_p	6.983036	0.8476553	0.1217136	0.0159452	2.446305×10^{-3}

7.0 Curves

Figure 1 - Mean forward current vs. Power dissipation - Double side cooled

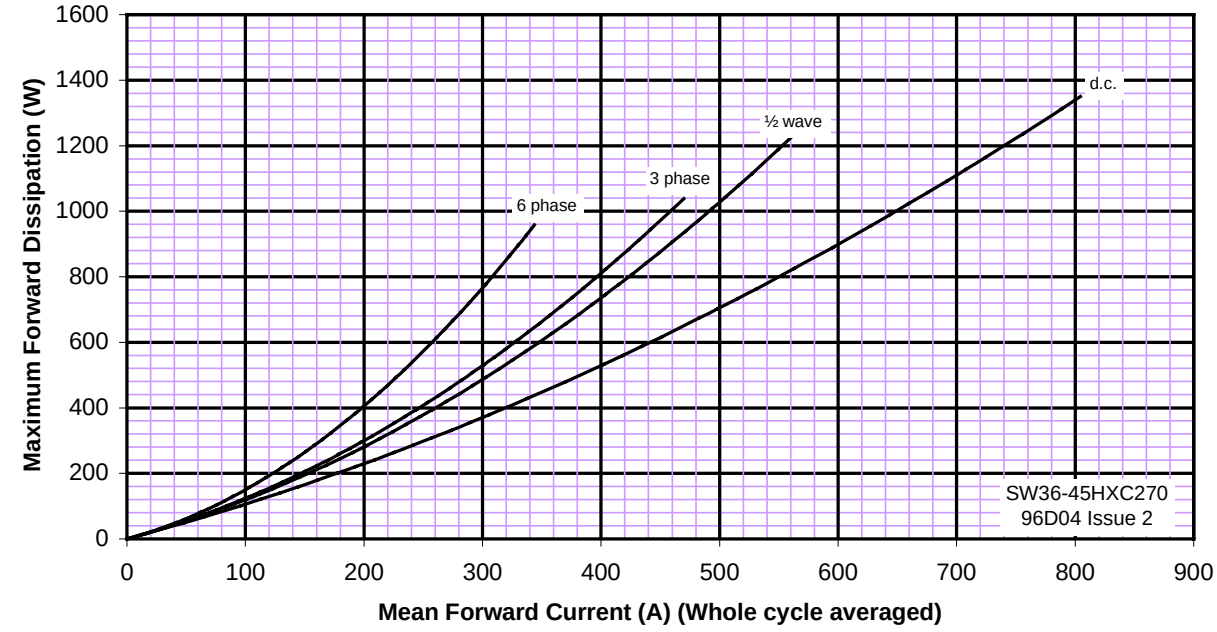


Figure 2 - Maximum permissable heatsink temperature vs. forward current - Double side cooled

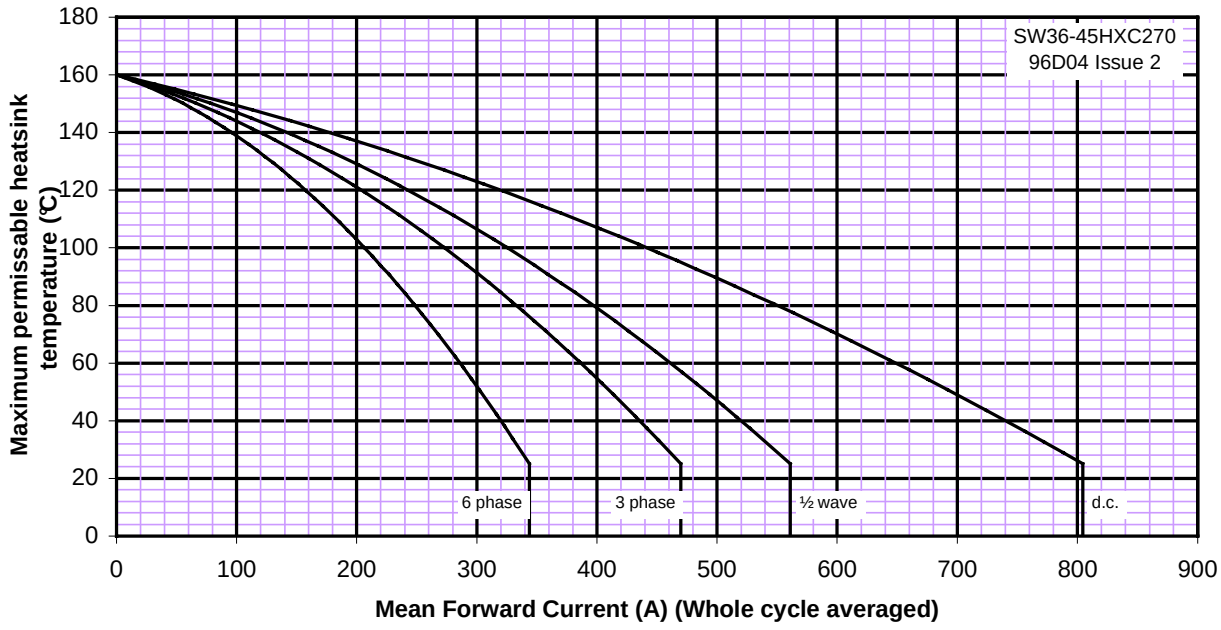


Figure 3 - Mean forward current vs. Power dissipation - Single side cooled

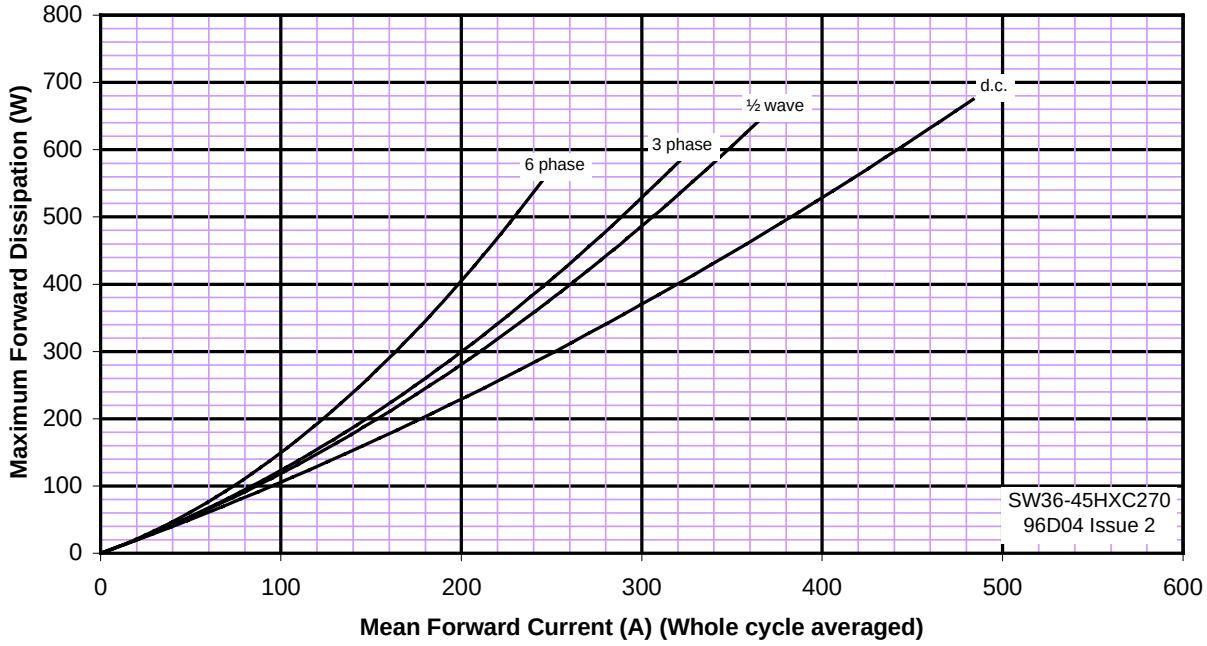


Figure 4 - Maximum permissable heatsink temperature vs. forward current - Single side cooled

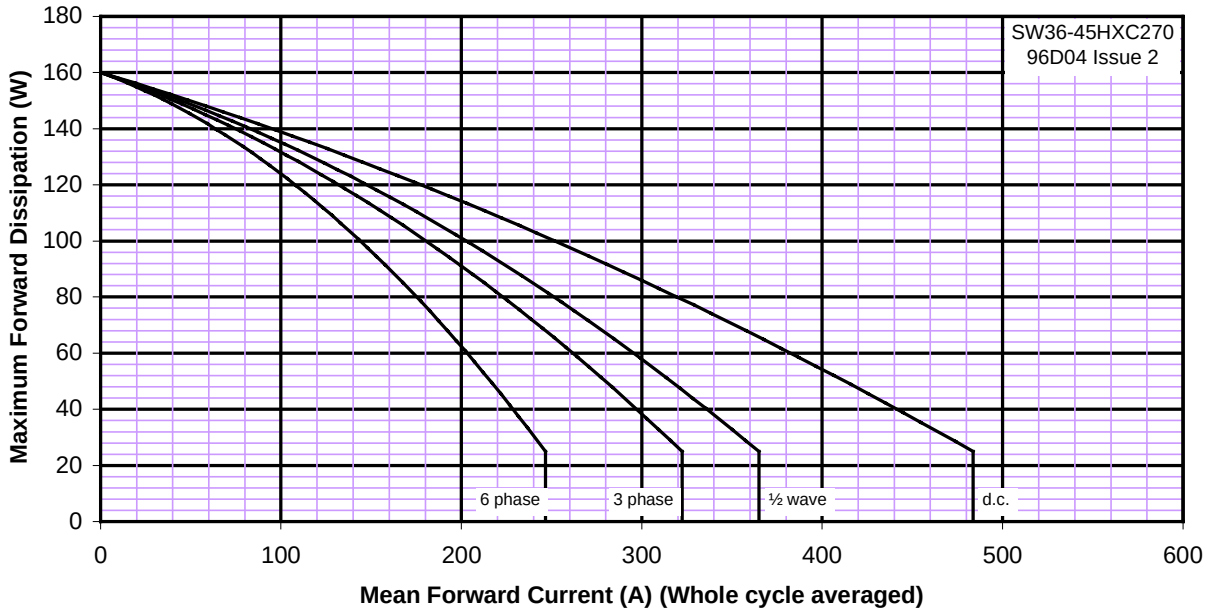


Figure 5 - Forward characteristics of limit device

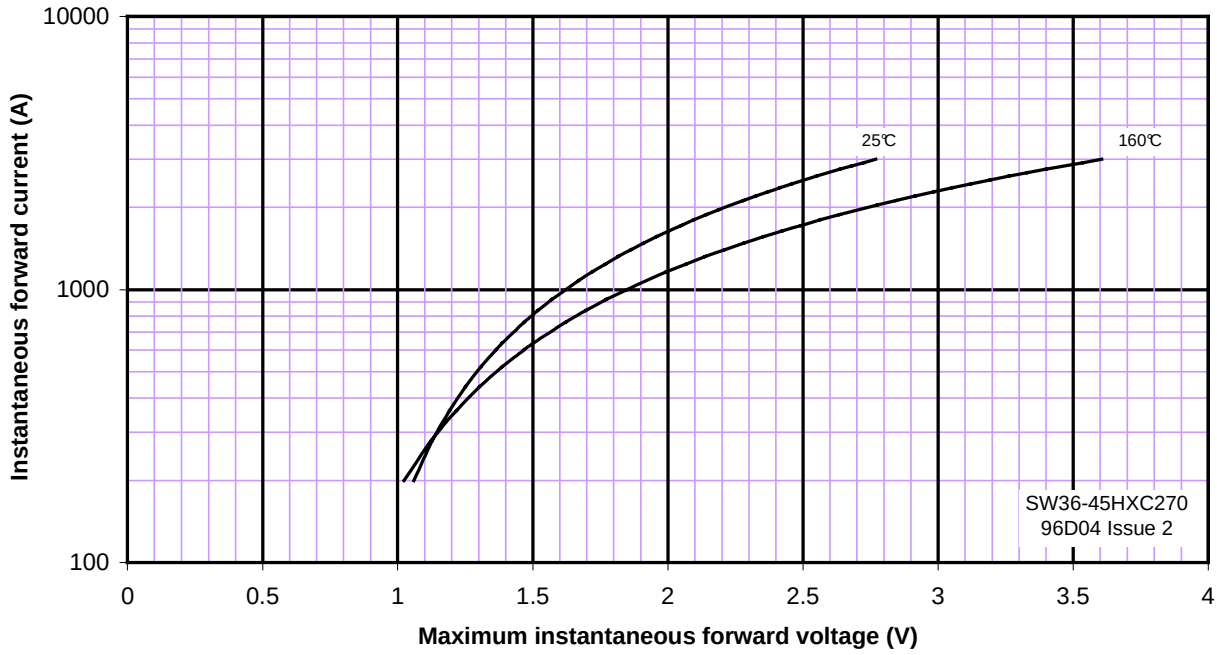


Figure 6 - Transient thermal impedance

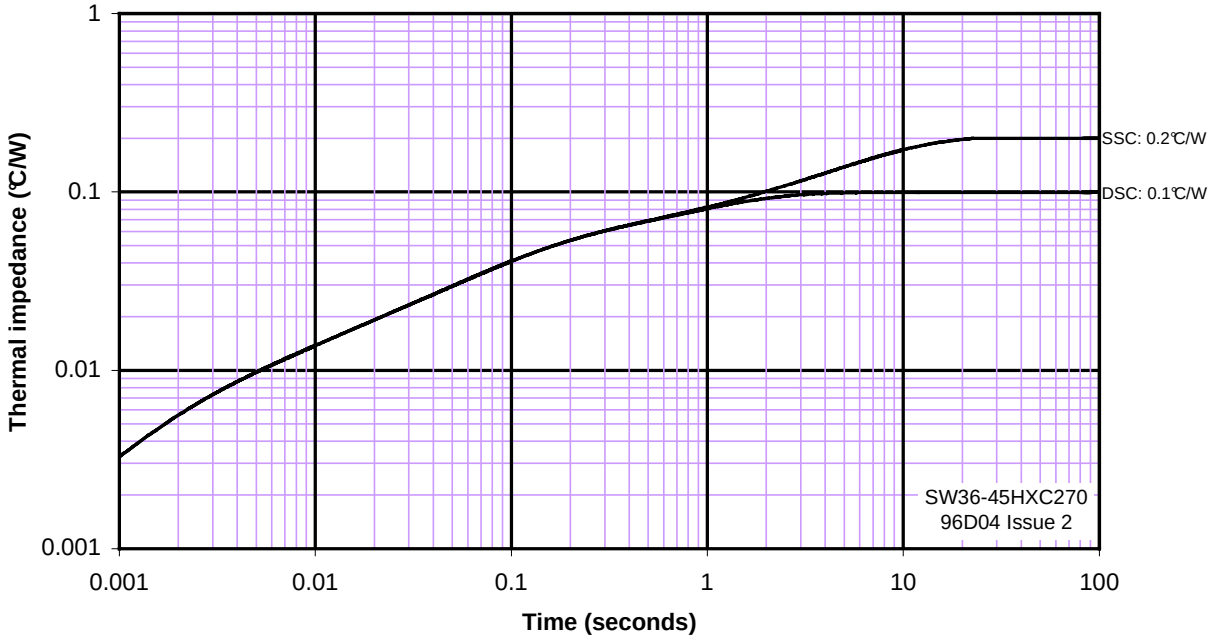
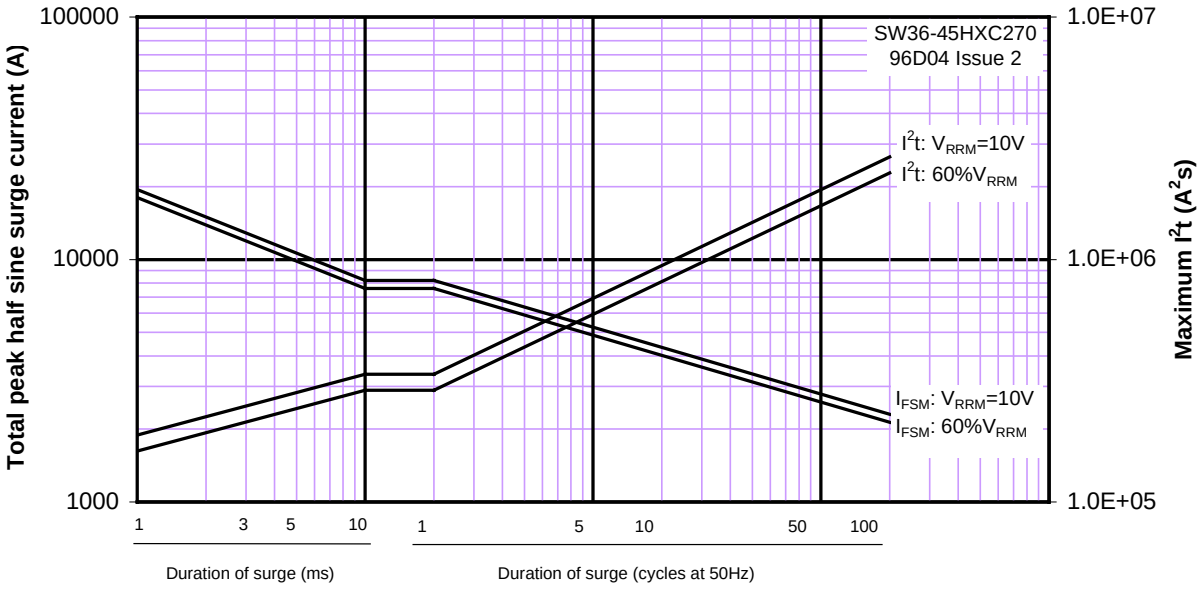
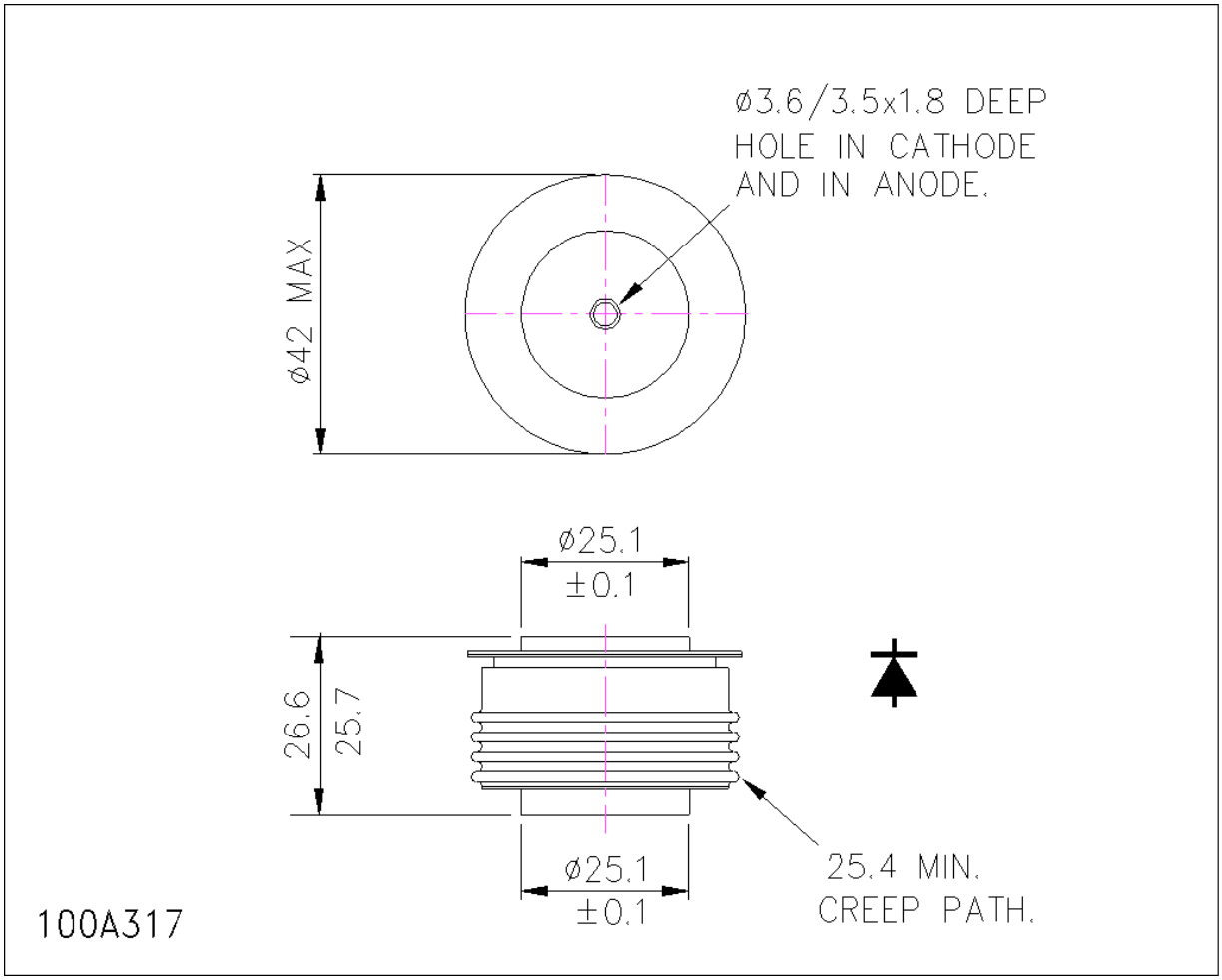


Figure 7 - Maximum non-repetitive surge current at initial junction temperature 160℃



8.0 Layout Drawing and Ordering Information



ORDERING INFORMATION		(Please quote 11 digit code as below)	
SW	♦ ♦	**HXC**	**270**
Fixed Type Code	Voltage Code	Fixed Outline Code	Fixed Type Code

Typical order code : SW45HXC270 – 4.5kV V_{RRM} Rectifier Diode, 26.6mm Clamp height capsule.

WESTCODE **SEMICONDUCTORS**

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Author: W. Findlay Authorised by .....

Capsule Diode
Type SW36-45HXC270

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