Rectifier Diode Stud
Types W0735S/RX040 to W0735S/RX150

The data sheet on the subsequent pages of this document is a scanned copy of existing data for this product.
(Rating Report 96DR08 Issue 1)

This data reflects the old part number for this product which is: SW02-15PHN/R470.
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:
Only S/RA outline drawing (W23) in datasheet
No reverse recovery information available
Device no longer available at grade 02 (200V V_{RRM})

The following links will direct you to the appropriate outline drawings
Outline W23 – ¾" Glass and metal stud
Outline W27 – ¾" Glass and metal stud removed

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			
W0735	S/R#	♦♦	**0**
Fixed Type Code	S/RA – ¾" Glass and metal stud S/RB – ¾" Glass and metal stud removed	Voltage code V_{RRM}/100 04-15	Fixed Code
Typical Order Code: W0735SA120, Normal polarity ¾" Glass and metal stud, 1200V V_{RRM}			

QUALITY AND EVALUATION LABORATORY

Rating Report No: 96DR08 Issue 1 Date: 23rd Aug. 1996

Origin: PAR 96012 Pages: 11

Diode Stud Base Type : SW02-15PHN/R470

Written by: R Hitchen. Checked: M Baker Approved: B. Scott.

This diode consists of a diffused 24 mm diameter silicon slice, reference DDLXN/R, mounted under spring pressure in a stud base, top-hat housing with a flexible lead.

Ratings

Voltage Grades	) A blocking voltage derating factor	: 02 - 15
V_{RSM}	) of 0.13% per deg. Celsius is applicable	: 300 - 1600V
V_{RRM}	) to this device for T_J below 25°C	: 200 - 1500V

$I_{F(AV)}$: Single phase: 50 Hz, 180° half sinewave; T_{CASE} = 140 °C : 350 A

$I_{F(rms)}$ Max. (Limited by connecting lead) : 550A

I_F Max. (Limited by connecting lead) : 550 A

I_{FSM} : t = 10ms half sinewave; T_J (initial) = 190 °C $V_{RM} = 0.6V_{RRM(MAX)}$: 9.0 kA

I_{FSM} : t = 10ms half sinewave; T_J (initial) = 190 °C $V_{RM} \leq 10V$: 10.0 kA

I^2t : t = 10ms; T_J (initial) = 190 °C; $V_{RM} = 0.6V_{RRM(MAX)}$: 405 $x10^3 A^2s$

I^2t : t = 10ms; T_J (initial) = 190 °C; $V_{RM} \leq 10V$: 500 $x10^3 A^2s$

I^2t : t = 3ms; T_J (initial) = 190 °C; $V_{RM} \leq 10V$: 360 $x10^3 A^2s$

T_{CASE}: Operating Range : -40 to +190 °C

T_{stg} : Non-operating : -55 to +190 °C

Characteristics (Maximum values unless otherwise stated)

V_o	: 0.79 V
r_s	: 0.342 mΩ
A : T_J = 25°C	: 0.933861601
B : T_J = 25°C	: -1.98094636E-02
C : T_J = 25°C	: 2.35239372E-04
D : T_J = 25°C	: 5.52084713E-03
A)	: 0.717850746
B) $V_F = A + B.\ln(i_F) + C.i_F + D\sqrt{i_F}$	: -1.13820768E-02
C)	: 2.83402379E-04
D)	: 6.10133431E-03
V_{FM} at I_{FM} = 1500	: 1.3V
$R_{th(J-C)}$	: 0.13 K/W
$R_{th(C-HS)}$	: 0.04 K/W
I_{RRM} : at $V_{RRM(MAX)}$	: 15 mA
V_{FR} : at dI/dt =	: ---
Reverse recovery at I_{FM} = A; t_p = µs di_R/dt = A/µs; V_{RM} = V	: ---
Q_{RR} (total area)	: ---
Q_{RA} (50% chord)	: ---
t_{RR} (50% chord)	: ---
I_{RM}	: ---
Mounting Torque	: 2.5 - 2.77 kg.m
Outline Drawing	: 100A281
JEDEC Outline No.	: ---

NOTE: All characteristics are at $T_{VJ} = T_{Jmax}$ operating unless stated otherwise.

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Changes

Page 2 V_{FM} at I_{FM} change from 628A to 1500A to bring in line with PHN300/400 test current.

Voltage Ratings

Voltage Class	V_{RRM} Volts	V_{RSM} Volts
2	200	300
4	400	500
6	600	700
8	800	900
10	1000	1100
12	1200	1300
14	1400	1500
15	1500	1600

1. This Report is applicable to higher or lower voltage grades when supply has been agreed by Sales/Production.

2. A blocking voltage derating factor of 0.13% per deg. Celsius is applicable to this device for T_J below 25°C.

Computer Modelling Parameters

1. Device Dissipation Calculations

$$I_{AV} = \frac{-V_0 + \sqrt{V_0^2 - 4*ff^2*r_s*(-W_{AV})}}{2*ff^2*r_s}$$

Where
V_o=0.79V, r_s=0.342 mΩ

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

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

ff = Form factor, see table below.

Supplementary Thermal Impedance						
Conduction Angle	30°	60°	90°	120°	180°	d.c.
Squarewave Single Side Cooled	0.1477	0.1397	0.1367	0.1351	0.1332	0.1306
Sinewave Single Side Cooled	0.1324	0.1317	0.1312	0.1308	0.1298	

Form Factors						
Conduction Angle	30°	60°	90°	120°	180°	d.c.
Squarewave	3.46	2.45	2	1.73	1.41	1
Sinewave	3.98	2.78	2.22	1.88	1.57	

2. Calculating V_f using ABCD Coefficients

The on-state characteristic I_F Vs V_F, on page 8 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 co-efficients of the representative equation for V_F in terms of I_F given below:

$$V_f = A + B * \ln(I_f) + C * (I_f) + D * \sqrt{I_f}$$

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 current range which is limited to that plotted.

190°C Coefficients		25°C Coefficients	
A	0.933862	A	0.717851
B	-1.9809463E-2	B	-1.13820768E-2
C	2.35239372E-4	C	2.83402379E-4
D	5.52084713E-3	D	6.10133431E-3

3. Thermal Impedance Calculation

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

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. Stud Base Cooled					
Term	1	2	3	4	5
r_p	1.178635E-01	6.872926E-03	3.721224E-03	8.985249E-04	1.227743E-03
τ_p	1.457910E+0	1.038778E+00	9.527481E-02	4.601923E-03	1.026993E-04

Dissipation and case temperature
Vs mean current

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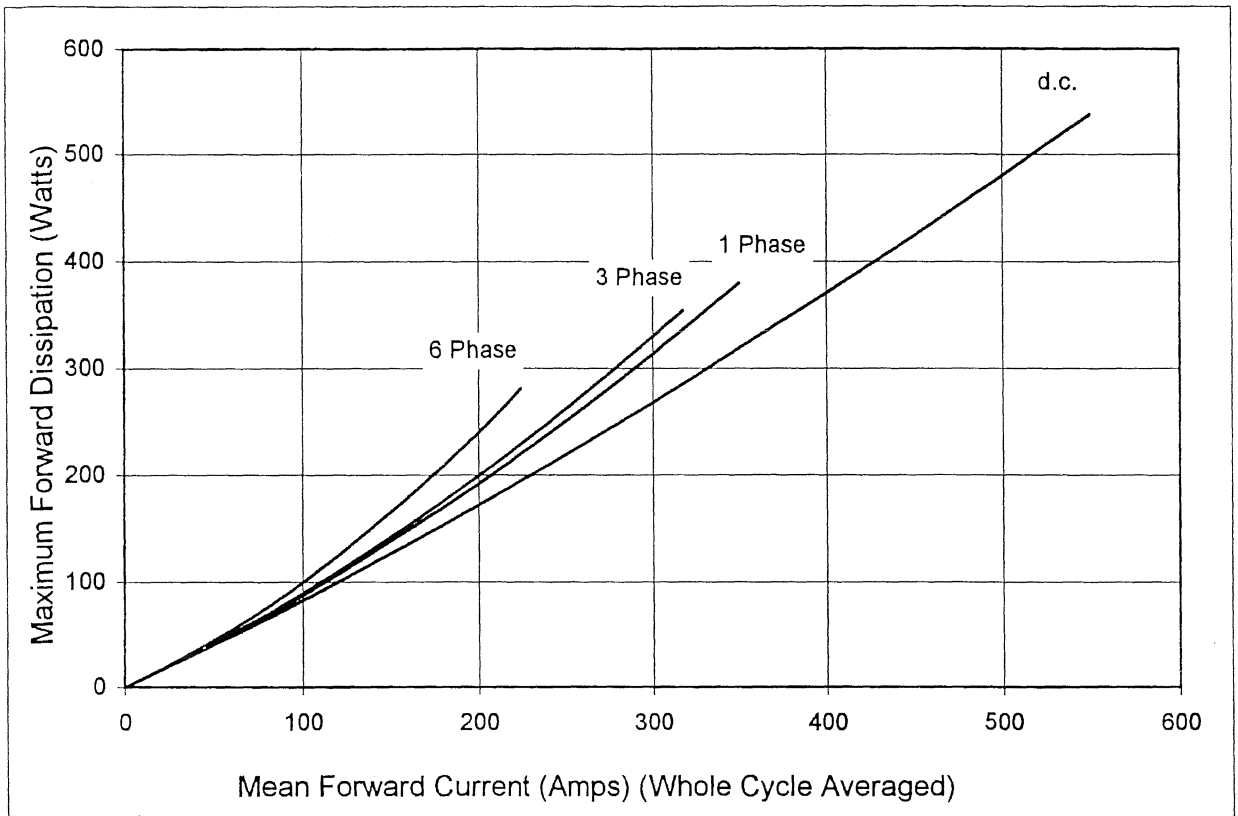
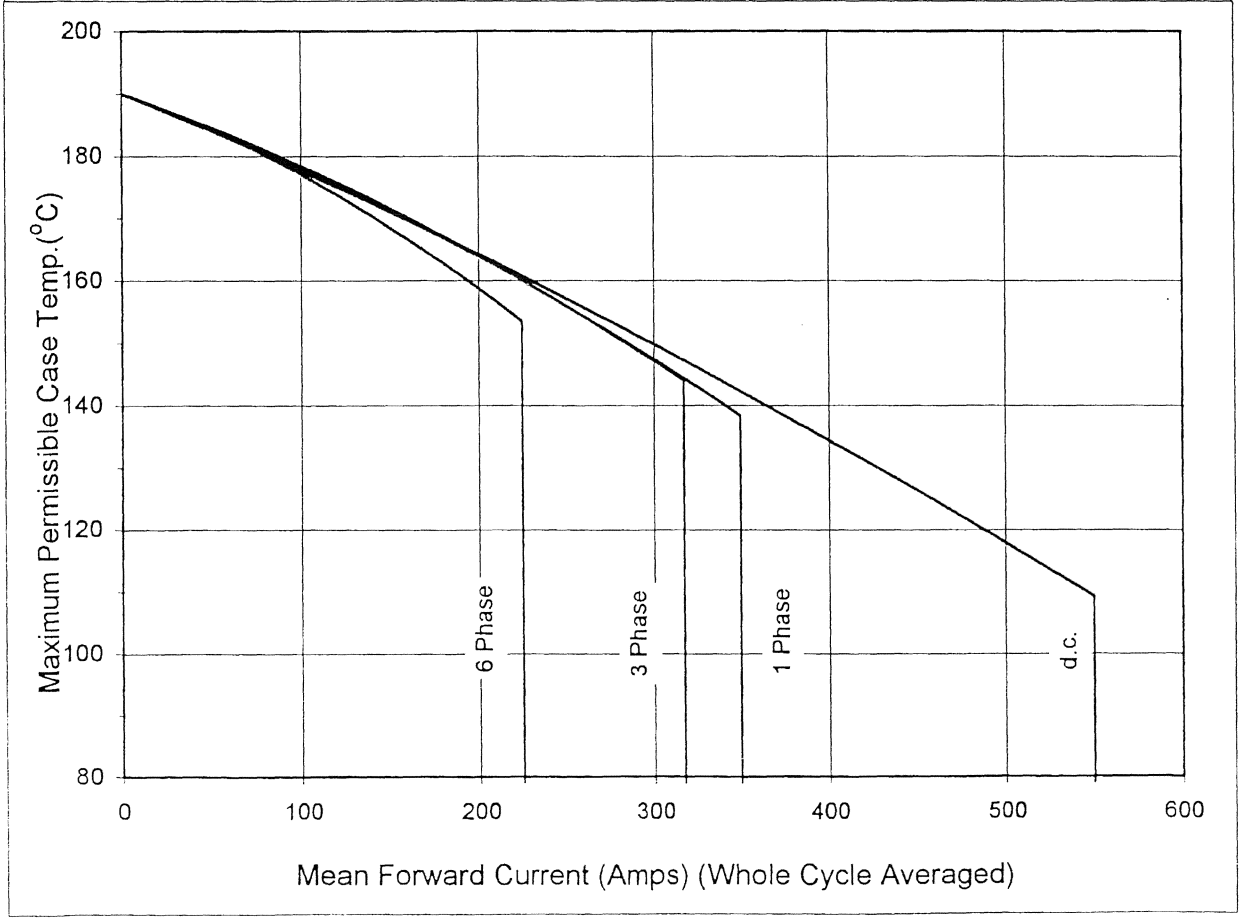
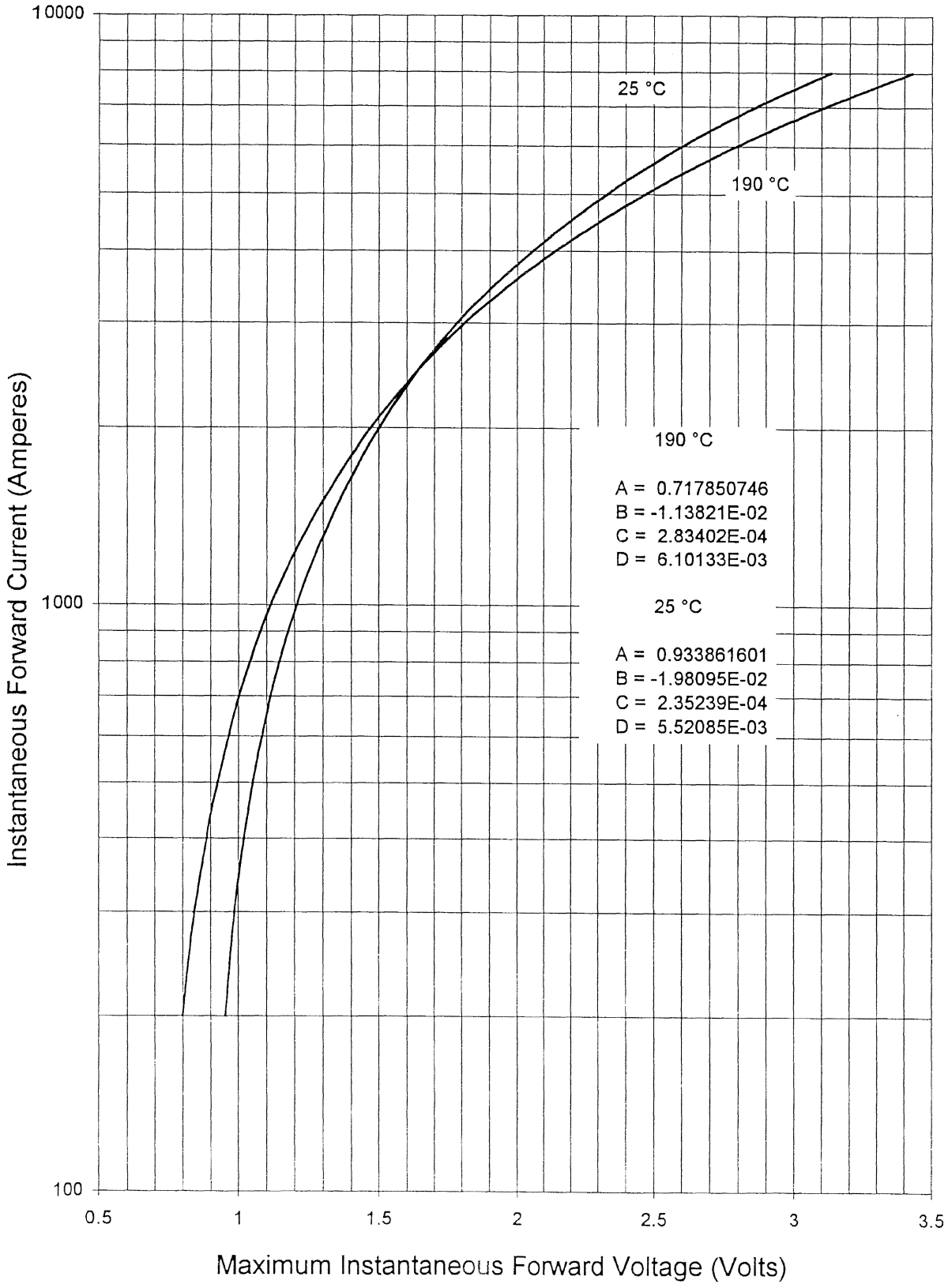
R.R. Issue	1

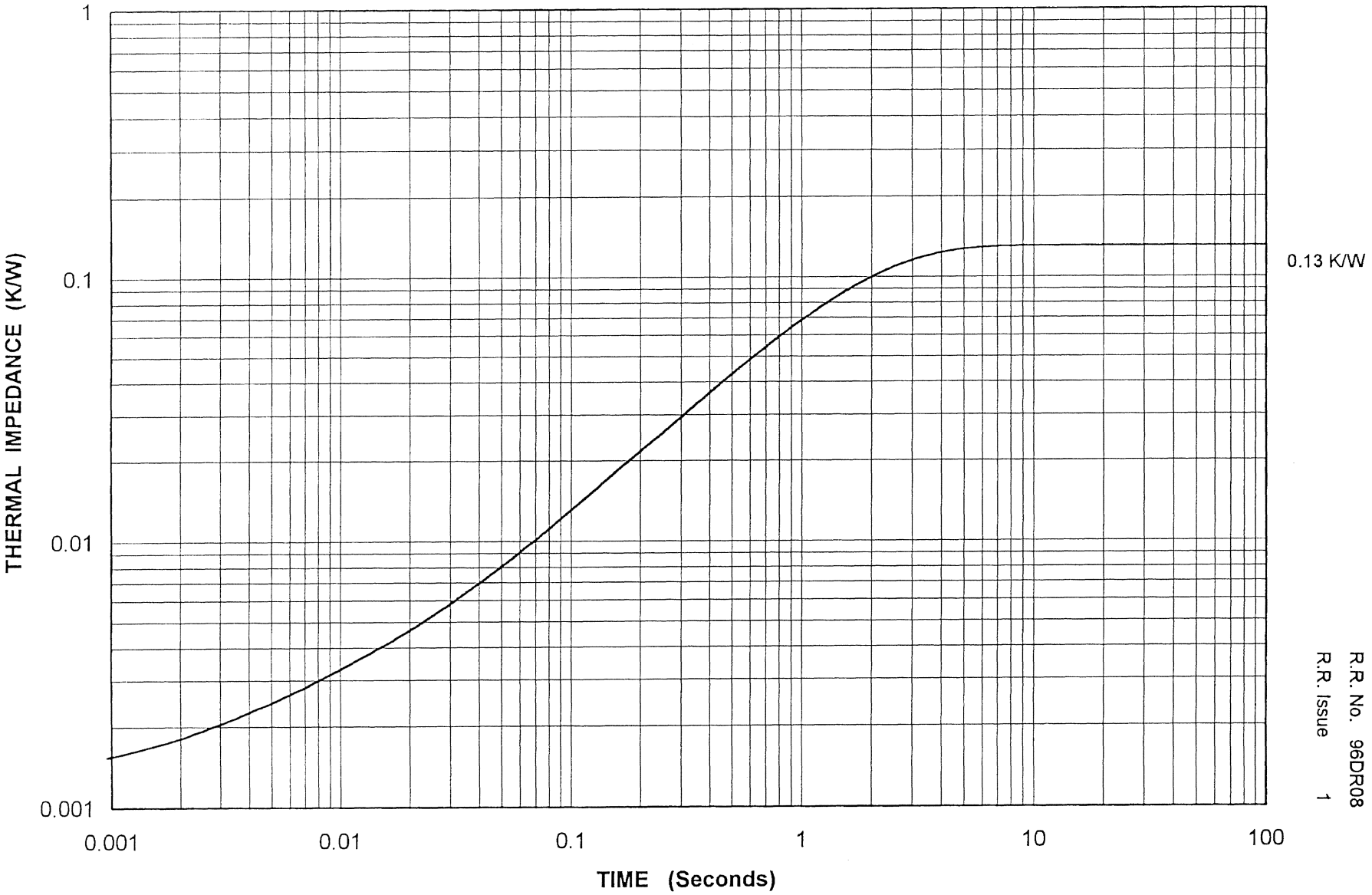




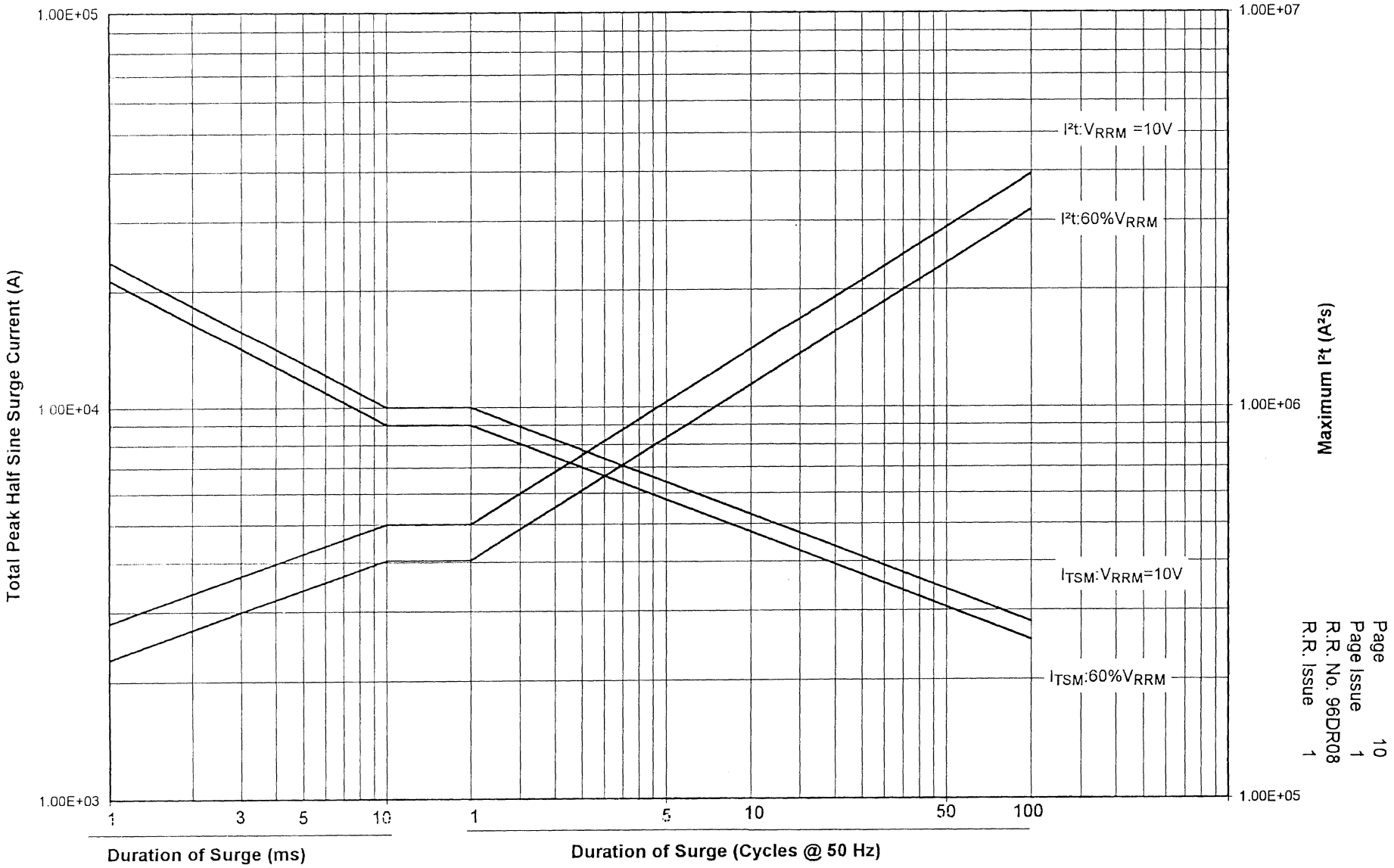
Forward Characteristic of Limit Device



TRANSIENT THERMAL IMPEDANCE (Junction to Case)



Maximum Non-Repetitive Surge Current
@ Initial Junction Temperature 190°C



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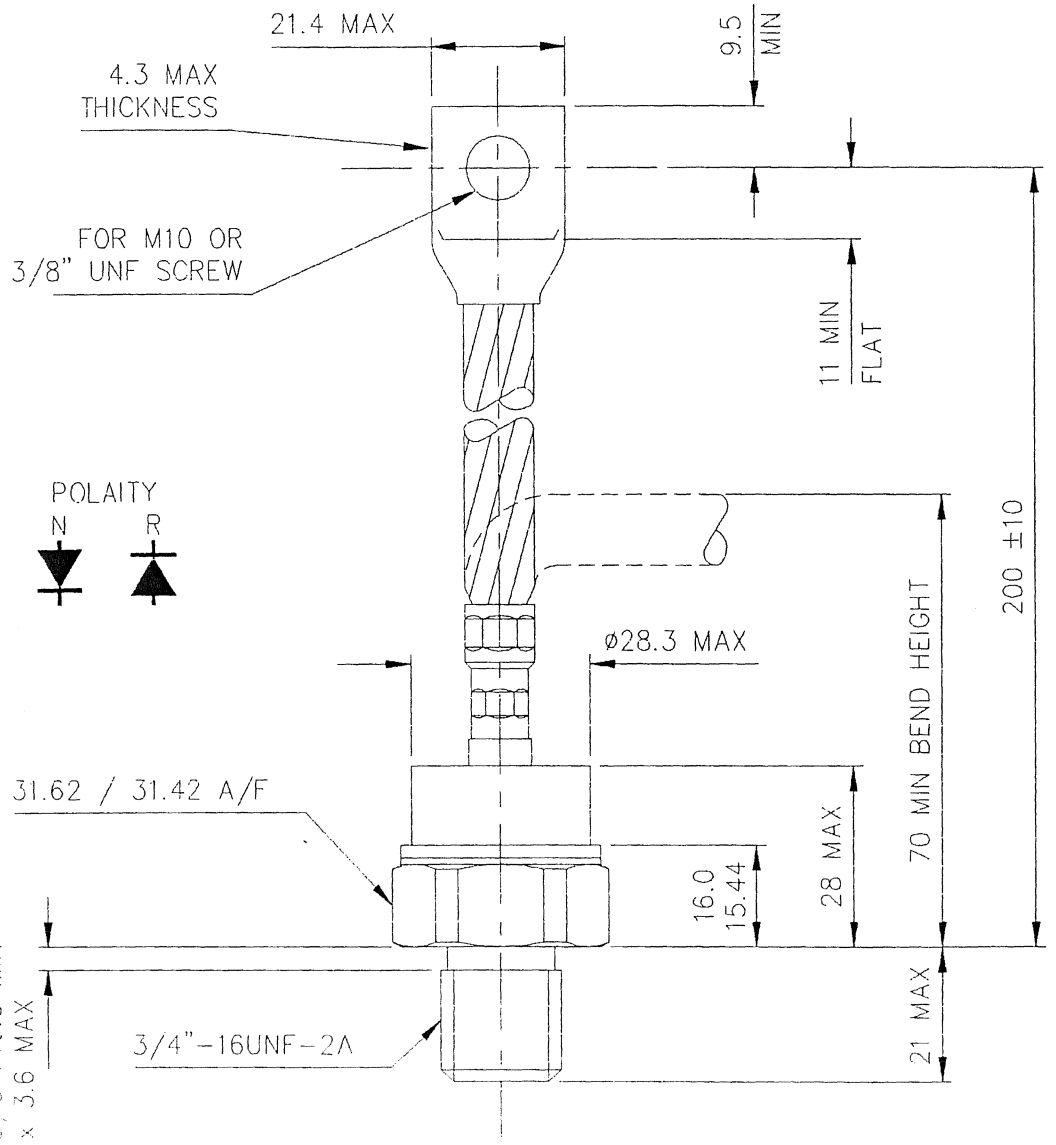
INTERNATIONAL OUTLINE No.
G.A. DWG No. 102A216H05 -11-
WEIGHT. 250 GRAMS
FINISH. BRIGHT NICKEL PLATE
DEVICE MOUNTING: MOUNTING TORQUE 27–24.5Nm (2.77–2.5kgf m)THREADS MUST NOT BE LUBRICATED
NOTES:
DEVICE MARKING INCLUDES MONOGRAM, TYPE No. SPEC No. AND POLARITY SYMBOL.

TYPE NUMBER

PHN/R170
PHN/R300
PHN/R400
PHN/R470



ISS	REVISIONS
1	11.9.78
6	11.7.96 M3020 E REDRAWN ON CAD B.B.B.
7	25.7.96 M3031 E TYPE No. PHN/R470 ADDED B.B.

SCALE 1:1
DRAWN BBB
DIST. A

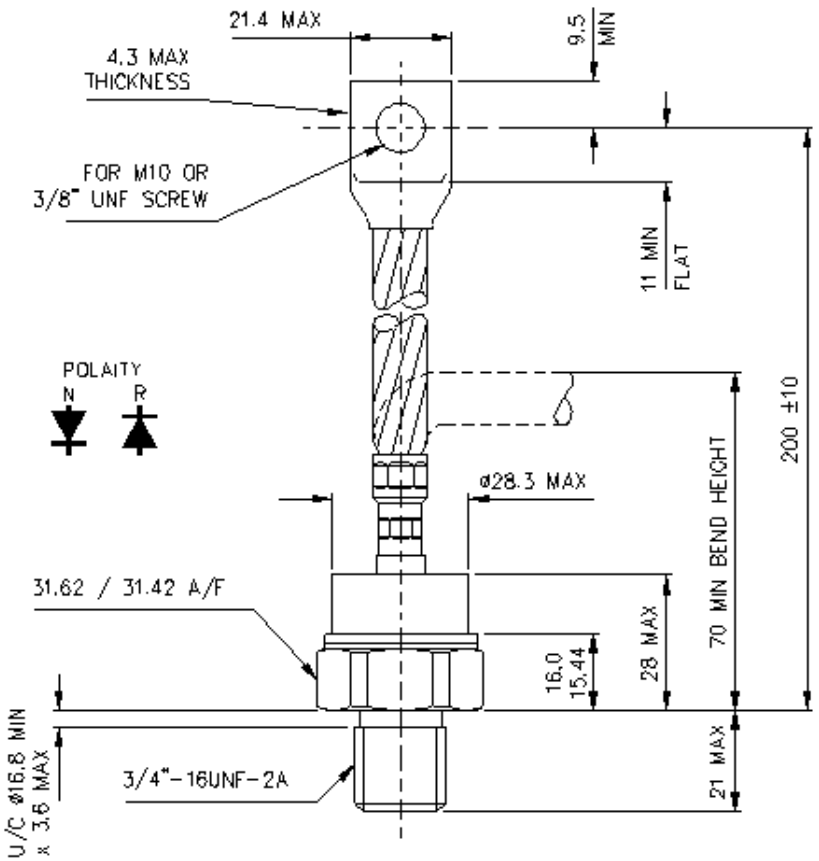
THIRD ANGLE PROJECTION.
DWG. COMPLIES WITH BS 308.
DIMNS. IN MILLIMETRES.
DWG No. 100A281

WESTCODE SEMICONDUCTORS LTD.,
P.O. BOX 57, CHIPPENHAM, WILTSHIRE, SN15 1JL, ENGLAND.
TEL 0249 441000. TELEFAX 0249 659448, 441250 & 441133.

Drawing Number – W23

Outline Number – 100A281

WESTCODE
An IXYS Company



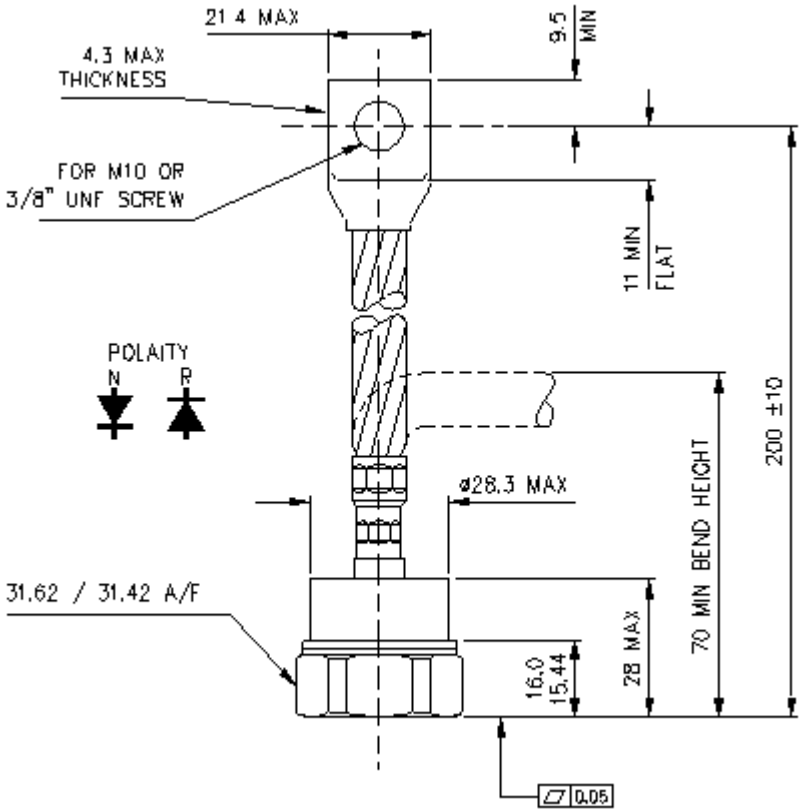
Weight 250g

Westcode Customer Services email: wsl.sales@westcode.com **Telephone: +44 (0)1249 444524 Fax: +44 (0)1249 659448**

Drawing Number – W27

Outline Number – 100A284

WESTCODE
An IXYS Company



Weight 250g

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