

# 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](#) – 3/4" Glass and metal stud  
[Outline W27](#) – 3/4" 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.

<b>Ordering Particulars</b>			
W0735	S/R#	◆◆	0
Fixed Type Code	S/RA – 3/4" Glass and metal stud S/RB – 3/4" Glass and metal stud removed	Voltage code $V_{RRM}/100$ 04-15	Fixed Code
Typical Order Code: W0735SA120, Normal polarity 3/4" Glass and metal stud, 1200V $V_{RRM}$			

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<p>In the interest of product improvement, Westcode reserves the right to change specifications at any time without prior notice.</p>			
<p>Devices with a suffix code (2-letter, 3-letter or letter/digit/letter combination) added to their generic code are not necessarily subject to the conditions and limits contained in this report.</p>			

**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/R470Written by: *R. Hitchen*Checked: *M. Baker*Approved: *B. Staff*

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; $T_{CASE} = 140^\circ C$	: 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 <sup>3</sup> A <sup>2</sup> s
$I^2t$	: t = 10ms; $T_J$ (initial) = 190 °C; $V_{RM} \leq 10V$	: 500 x10 <sup>3</sup> A <sup>2</sup> s
$I^2t$	: t = 3ms; $T_J$ (initial) = 190 °C; $V_{RM} \leq 10V$	: 360 x10 <sup>3</sup> A <sup>2</sup> s
$T_{CASE}$ : 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 m $\Omega$
A : $T_J = 25^\circ\text{C}$	: 0.933861601
B : $T_J = 25^\circ\text{C}$	: -1.98094636E-02
C : $T_J = 25^\circ\text{C}$	: 2.35239372E-04
D : $T_J = 25^\circ\text{C}$	: 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 $I_{FM} = A$ ; $t_p = \mu\text{s}$ $di_R/dt = A/\mu\text{s}$ ; $V_{RM} = V$	: ---
$Q_{RR}$ (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

$$V_0 = 0.79V, r_s = 0.342 \text{ m}\Omega$$

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

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

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

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

Where

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

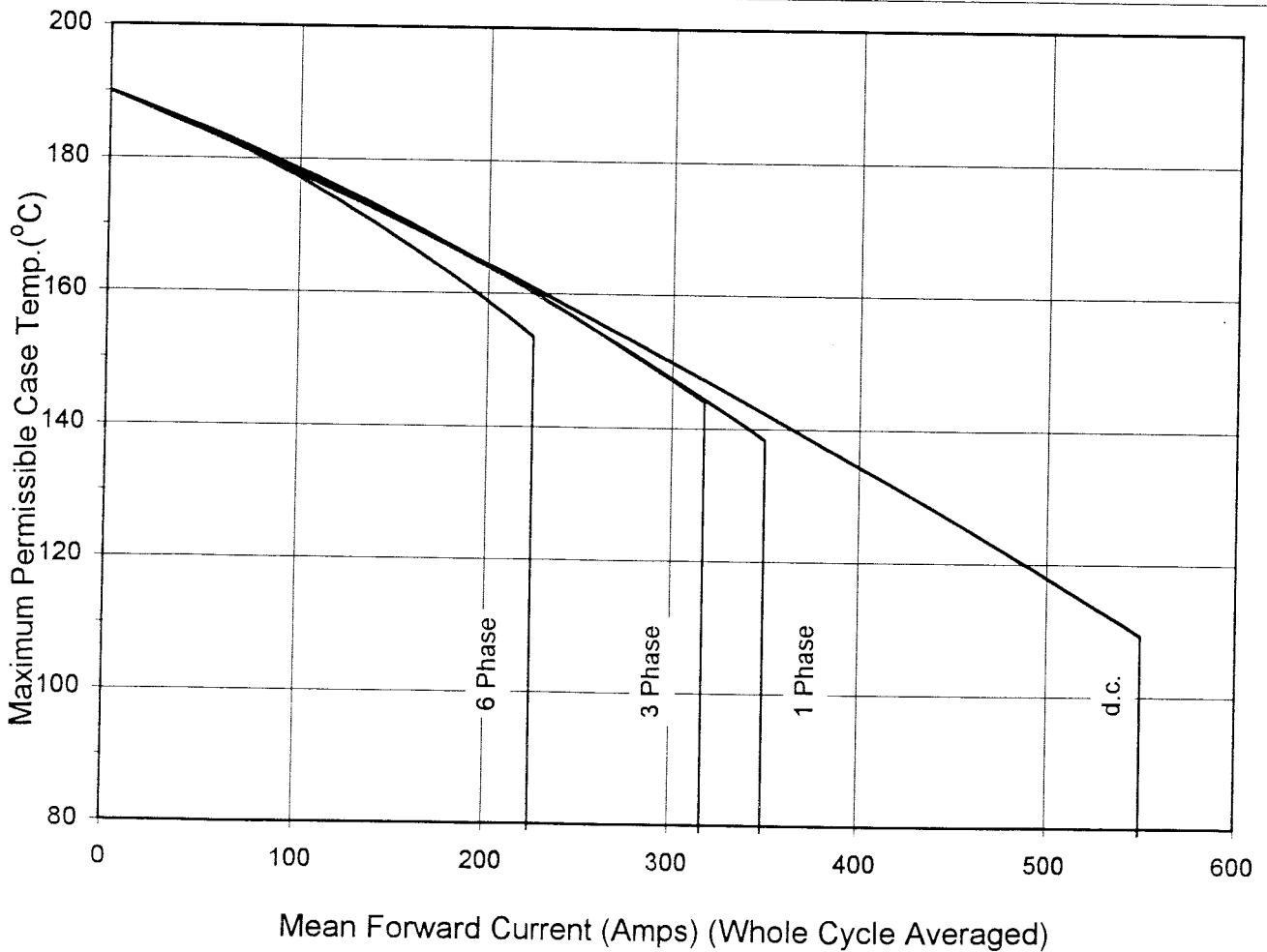
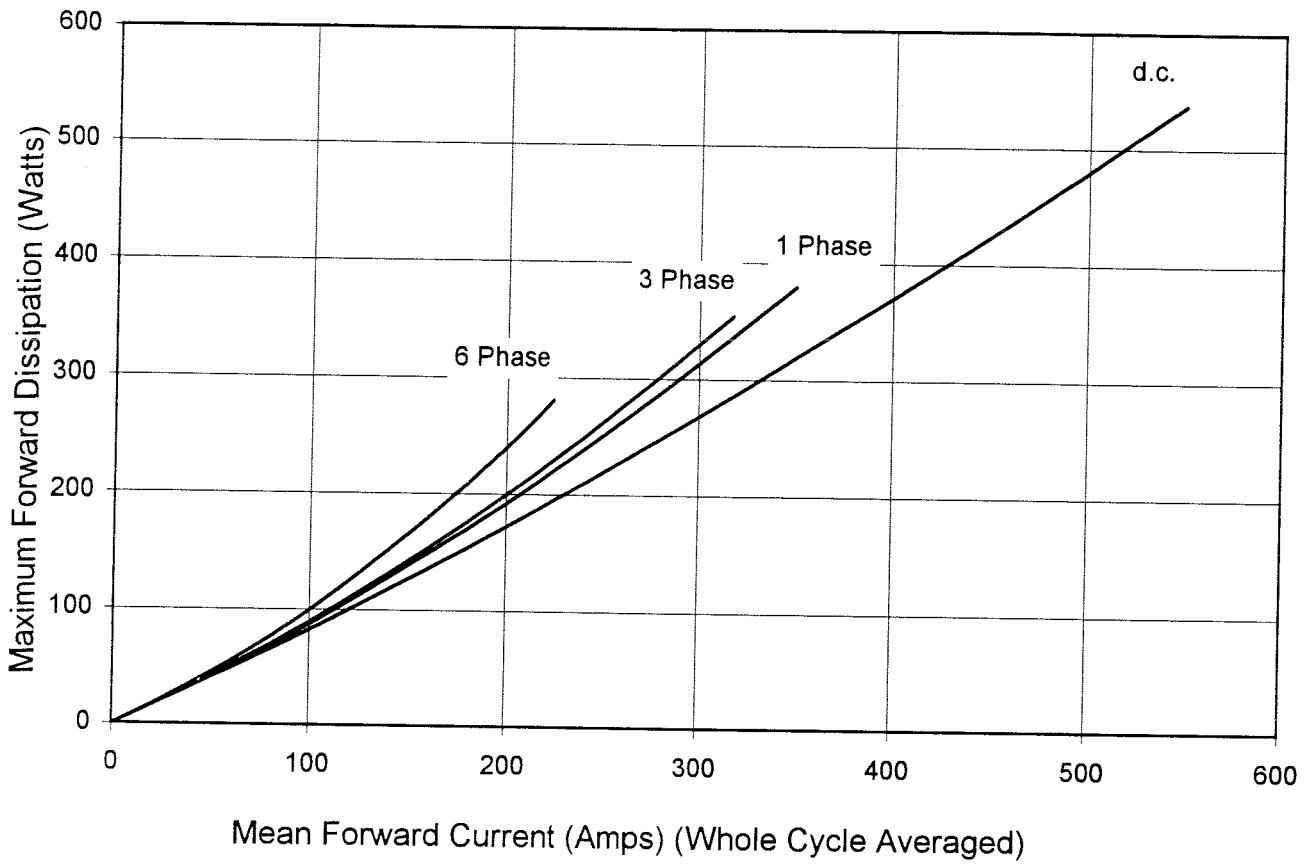
$t$  = Duration of heating pulse in seconds.

$r_t$  = Thermal resistance at time  $t$ .

$r_p$  = Amplitude of  $p$ th term.

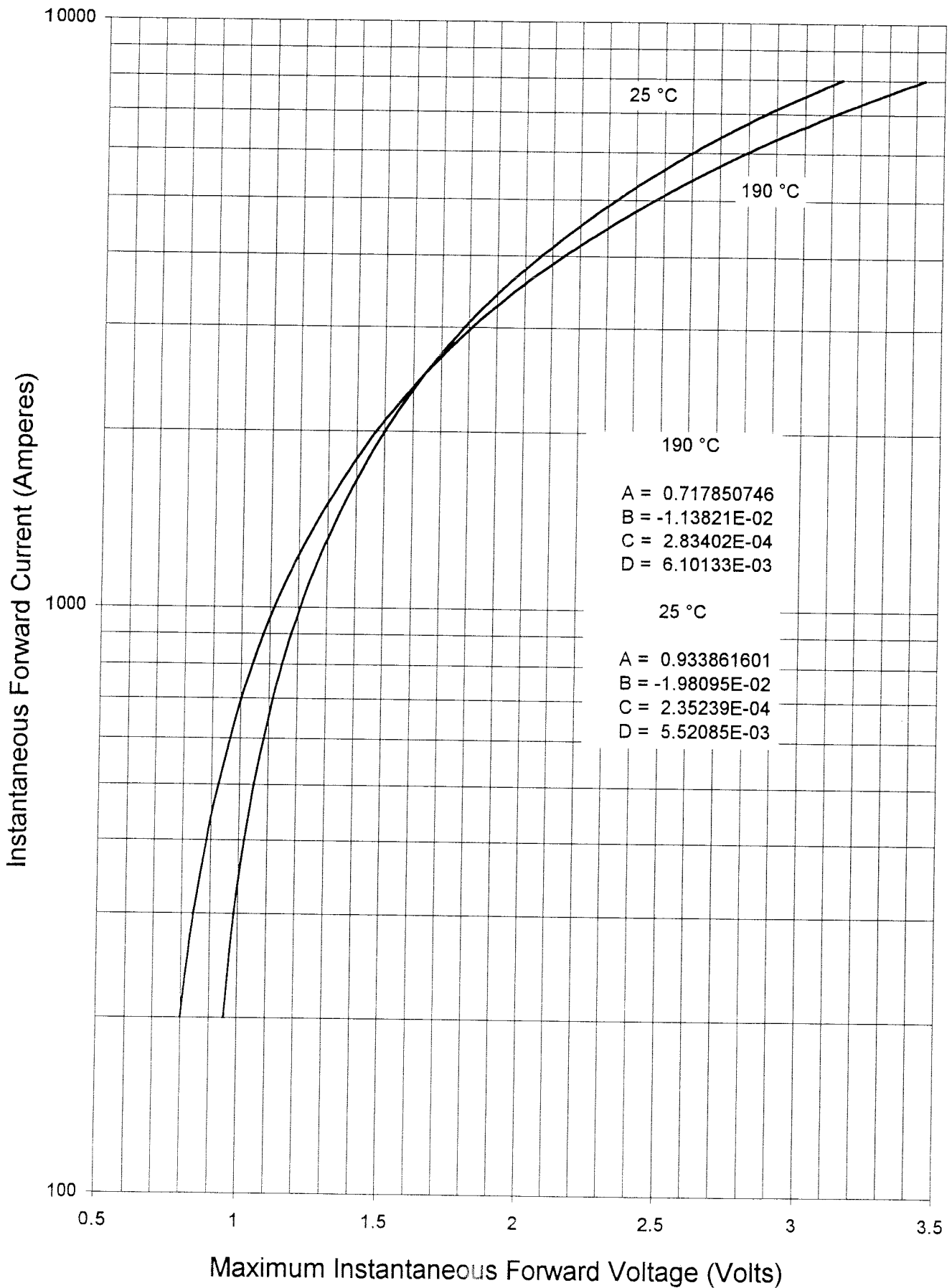
$\tau_p$  = Time Constant of  $p$ th term.

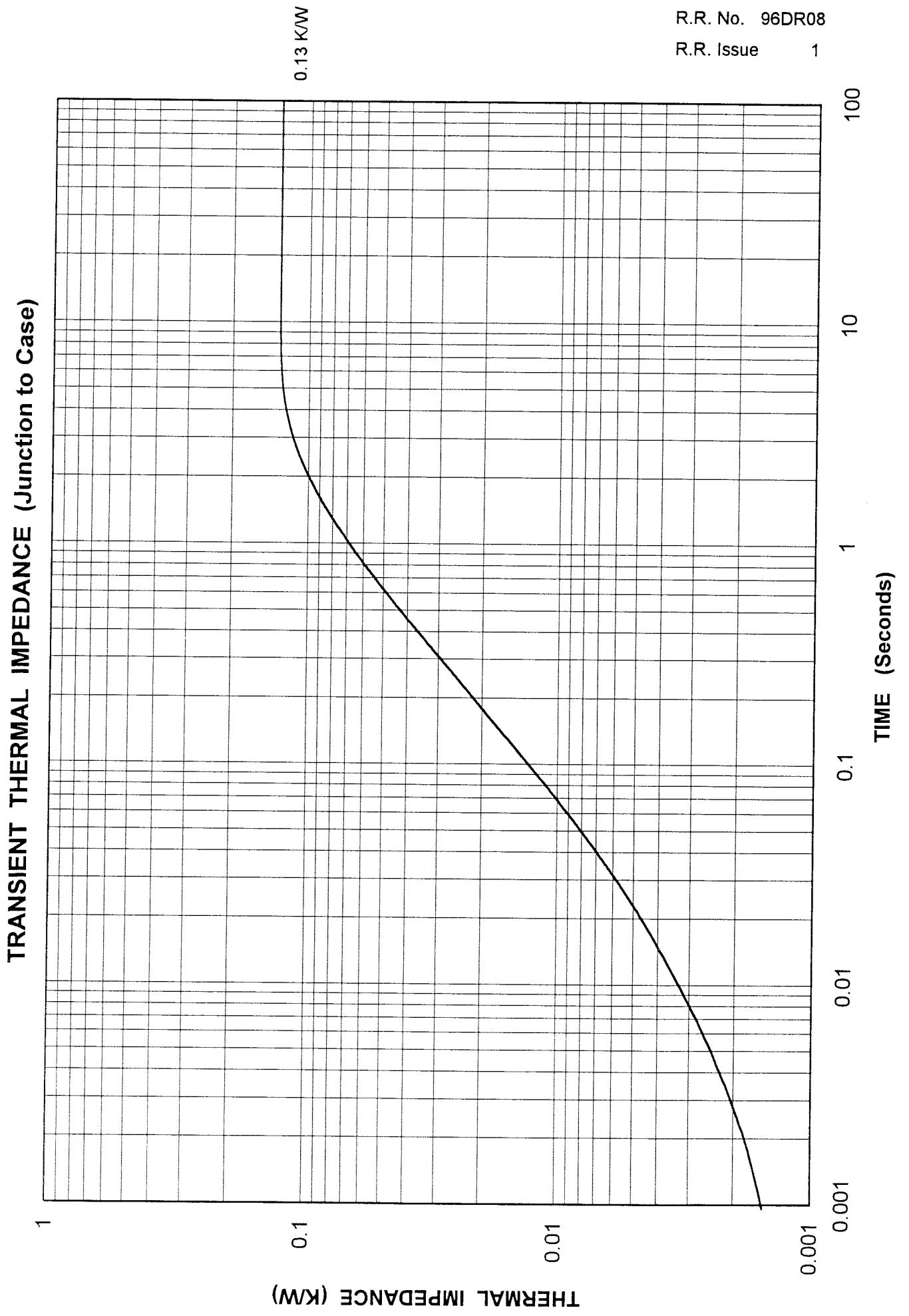
D.C. Stud Base Cooled					
Term	1	2	3	4	5
$r_p$	1.178635E-01	6.872926E-03	3.721224E-03	8.985249E-04	1.227743E-03
$\tau_p$	1.457910E+0	1.038778E+00	9.527481E-02	4.601923E-03	1.026993E-04



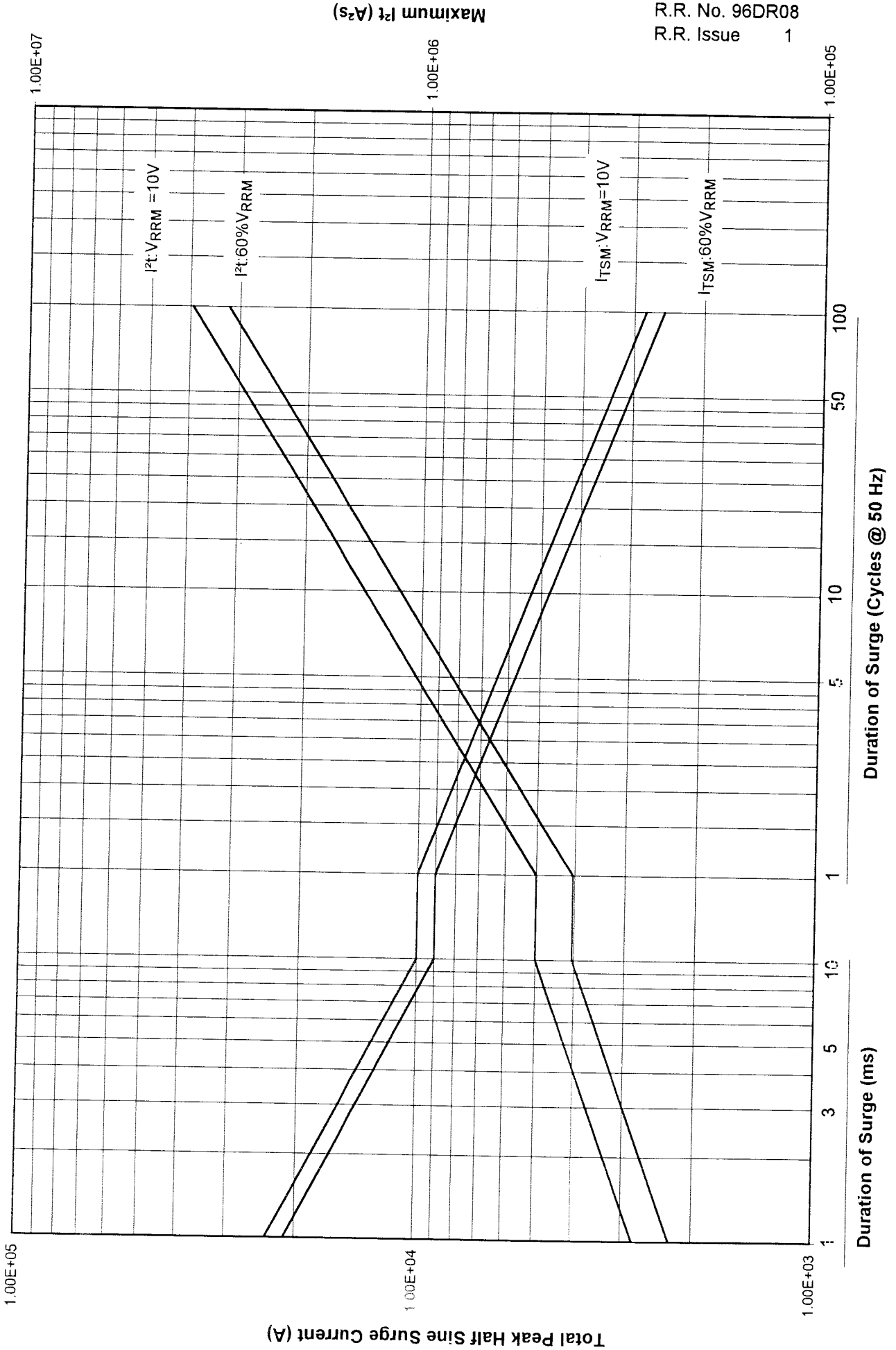


# Forward Characteristic of Limit Device





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

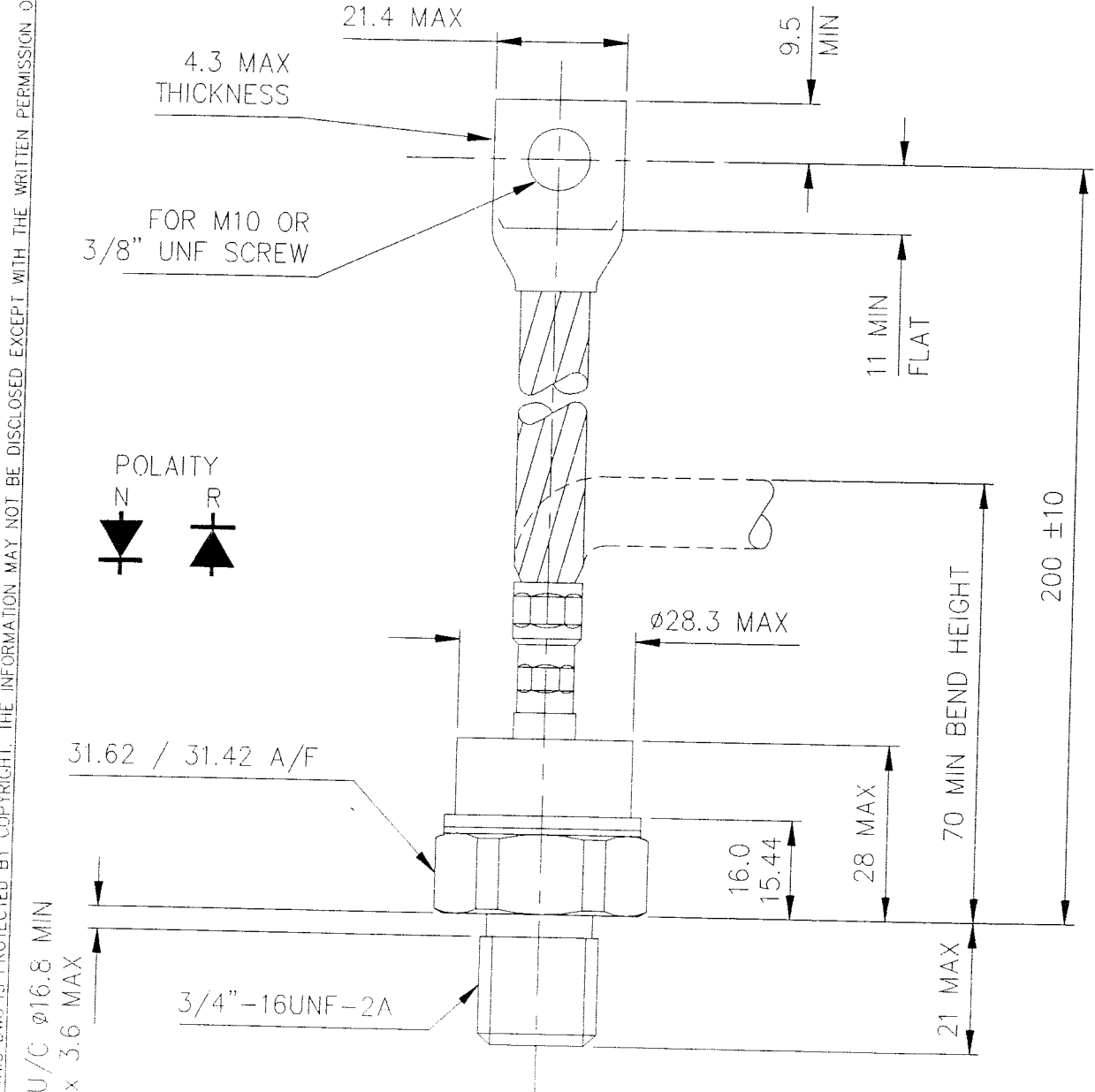


INTERNATIONAL OUTLINE No.  
G.A. DWG No. 102A216H05  
WEIGHT. 250 GRAMS  
FINISH. BRIGHT NICKEL PLATE  
DEVICE MOUNTING: MOUNTING TORQUE 27-24.5Nm  
(2.77-2.5kgf m) THREADS MUST NOT BE LUBRICATED

- 11 -

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

NOTES:  
DEVICE MARKING INCLUDES MONOGRAM,  
TYPE No. SPEC No. AND POLARITY SYMBOL.



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SCALE	ISS	REVISIONS
1:1	1	11:9:78
DRAWN	6	11:7:96 M3020
DIST: A	E	REDRAWN ON CAD B.B.B
	7	25:7:96 M3031
	E	TYPE No. PHN/R470 ADDED B.B.B.

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

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