Soft Recovery Diode
M0433WC120 to M0433WC200

The data sheet on the subsequent pages of this document is a scanned copy of existing data for this product.
(Rating Report 80NR14 Issue 2)

This data reflects the old part number for this product which is: SM12-20CXC174. 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:
This device is available for grades 12 to 20 (1200V to 2000V V_{RRM})

Please use the following link to view an up to date outline drawing for this device
Outline W1

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			
M0433	WC	♦♦	**0**
Fixed Type Code	Fixed Outline Code	Voltage code V_{DRM}/100 12-20	Fixed Code
Typical Order Code: M0433WC120, 14mm clamp height, 1200V V_{RRM}			

IXYS Semiconductor GmbH
Edisonstraße 15
D-68623 Lampertheim
Tel: +49 6206 503-0
Fax: +49 6206 503-627
E-mail: marcom@ixys.de

IXYS Corporation
3540 Bassett Street
Santa Clara CA 95054 USA
Tel: +1 (408) 982 0700
Fax: +1 (408) 496 0670
E-mail: sales@ixys.net

WESTCODE
An IXYS Company

www.westcode.com

www.ixys.com

Westcode Semiconductors Ltd
Langley Park Way, Langley Park,
Chippenham, Wiltshire, SN15 1GE.
Tel: +44 (0)1249 444524
Fax: +44 (0)1249 659448
E-mail: WSL.sales@westcode.com

Westcode Semiconductors Inc
3270 Cherry Avenue
Long Beach CA 90807 USA
Tel: +1 (562) 595 6971
Fax: +1 (562) 595 8182
E-mail: WSI.sales@westcode.com

QUALITY EVALUATION LABORATORY

Rating Report: 80NR14(Issue 2) Date: 25th February, 1986

Origin: Pages: 22

Diode Type SM12-18CXC174

Written by: M.W. Dunlop Checked: M.W. Approved: B.J.H.

This diode consists of a diffused, fast recovery 24 mm diameter silicon slice mounted in a cold weld capsule housing.

This report supersedes Rating Report No. 80NR14.

Ratings

Voltage Grades	: 12-18
V_{RSM}	: 1300-1900V
V_{RRM}	: 1200-1800V
$I_{F(AV)}$: Single phase; 50 Hz, 180° half sinewave; (Converter Ratings)	:
Double Side Cooled T_{HS} = 55°C, 100°C	: 434A; 202A
Single Side Cooled T_{HS} = 100°C	: 114A
$I_{F(rms)}$ T_{HS} = 25°C)	: 870A
I_F T_{HS} = 25°C) Double side cooled	: 724A
I_{FSM} : t = 10ms half sinewave; T_J (initial) = 125°C ; V_{RM} = 0.6$V_{RRM(MAX)}$	: 4500A
I_{FSM} : t = 10ms half sinewave; T_J (initial) = 125°C ; V_{RM} 10V	: 4950A
I^2t : t = 10ms; T_J (initial = 125°C ; V_{RM} = 0.6V_{RRM} (MAX)	:1.01 x $10^5 A^2S$
I^2t : t = 10ms; T_J (initial) = 125°C; V_{RM} 10V	:1.22 x $10^5 A^2S$
I^2t : t = 3ms; T_J (initial = 125°C ; V_{RM} 10V	: 0.91 x $10^5 A^2$
T_{HS} Operating Ramge	:-40 to +125°C
T_{stg}; Non-operating	:-40 to +150°C

Characteristics

(Maximum values unless stated otherwise)

V_O : T_J = 125°C	: 1.0V
r_s : T_J = 125°C	: 0.74mohm
V_{FM} : I_{FM} = 635A T_{VJ} = 125°C	: 1.47V
R_{th}(J-HS) Double side cooled	: 0.09°C/W
Single side cooled	:0.18°C/W
I_{RRM} : T_J = 125°C V_{RM} = $V_{RRM(MAX)}$	: 20mA
Q_{rr} : I_{FM} = 550A ; dI/dt = 40A/uS (50% chord value)	:
V_{RM} = 50V T_{VJ} = 125°C	:160uC
t_{rr} (conditions as above)	:
Mounting Force	: 330-550Kg.f
Outline Drawing	: 100A241
JEDEC NO.	: DO-200AA

CONTENTS

Voltage Ratings

Voltage Class	V_{RRM} V	V_{RSM} V
12	1200	1300
14	1400	1500
16	1600	1700
18	1800	1900

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

2.0 INTRODUCTION

The diode series comprises fast recovery cold-weld capsules with all diffused silicon slices. All these diodes have controlled reverse recovery characteristics with good "S" factors.

3.0 NOTES ON THE RATINGS

(a) Square wave ratings

These ratings are given for leading edge linear rates of rise of forward current of 200 and 100A/uS

(b) Energy per pulse characteristics

These curves enable rapid estimation of device dissipation to be obtained for conditions not covered by the frequency ratings.

Let: Ep be the Energy per pulse for a given current and pulse width, in joules.

Then $W_{AV} = Ep \times f.$

and $T_{SINK} = T_{J(MAX)} - W_{AV} R_{th}$

4.0 REVERSE RECOVERY LOSS

On account of the number of circuit variables affecting reverse recovery voltage, no allowance for reverse recovery loss has been made in these ratings. The following procedure is recommended for use where it is necessary to include reverse recovery loss.

(a) Determination by Measurement

From waveforms of recovery current obtained from a high frequency shunt (see Note 1) and reverse voltage present during recovery, an instantaneous reverse recovery loss waveform must be constructed. Let the area under this waveform be A joules per pulse. A new heat sink temperature can then be evaluated from:

$$T_{SINK}\ (new) = T_{SINK}\ (original) - A \left(\frac{r_t \cdot 10^6}{t} + R_{th} \times f\right)$$

where $r_t = 1.64 \times 10^{-4} \sqrt{t}$

t = duration of reverse recovery loss per pulse in microseconds

A = Area under reverse loss waveform per pulse in joules (W.S.)

f = rated frequency at the original heat sink temperature

The total dissipation is now given by

$$W_{(TOT)} = W_{(original)} + Axf$$

NOTE 1

REVERSE RECOVERY LOSS BY MEASUREMENT

This device has a low reverse recovered charge and peak reverse recovery current. When measuring the charge care must be taken to ensure that:

(a) a.c. coupled devices such as current transformers are not affected by prior passage of high amplitude forward current.

(b) The measuring oscilloscope has adequate dynamic range - typically 100 screen heights - to cope with the initial forward current without overload.

(c) Measurement of reverse recovery voltage waveform should be carried out with an appropriate snubber of 0.1uF and 5 ohms in series connected across diode anode to cathode.

(b) Design Method

In circumstances where it is not possible to measure voltage and current conditions, or for design purposes, the additional losses may be estimated from curves on page

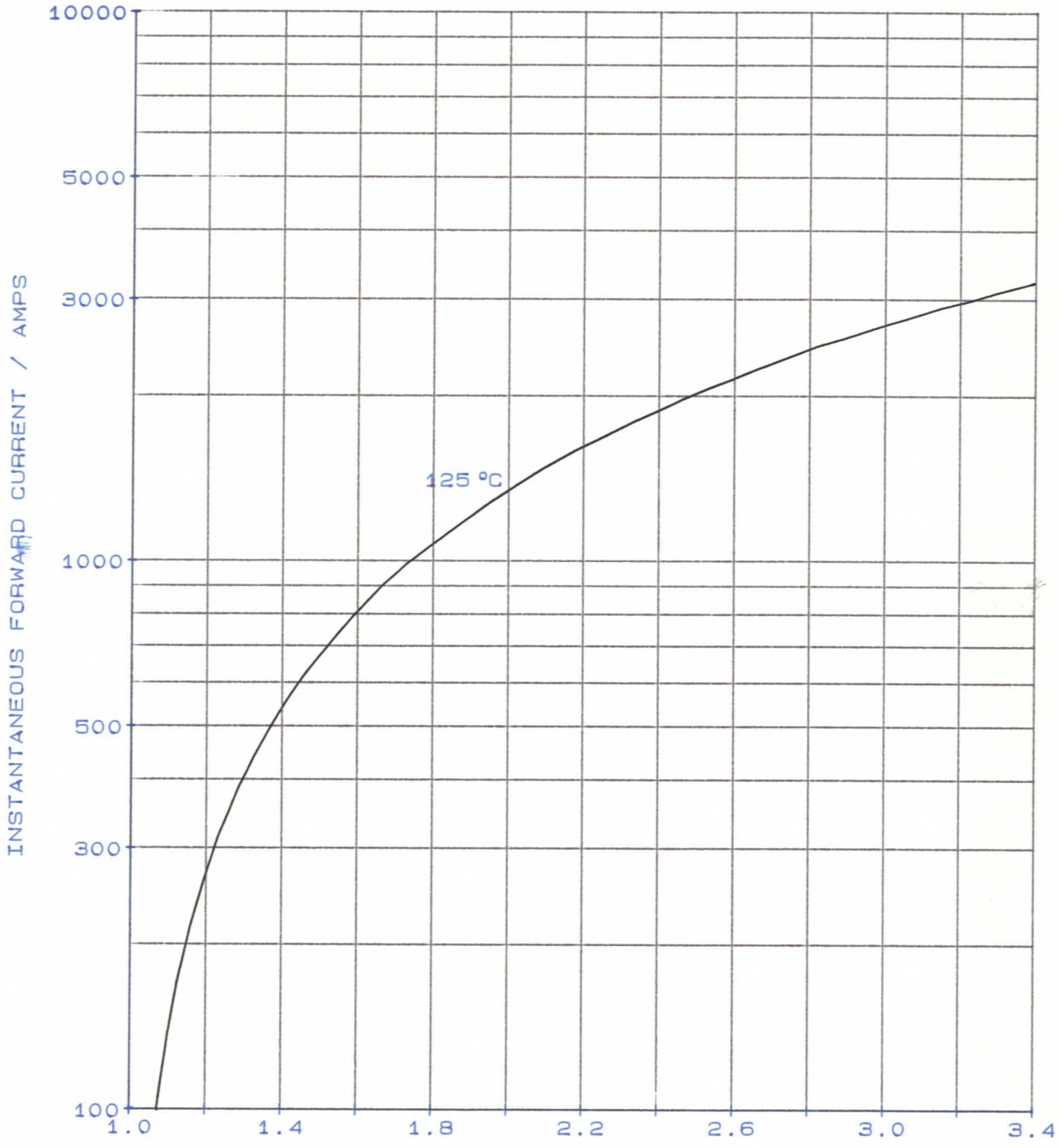
Let E be the value of energy per reverse cycle in joules (curves on page 12)

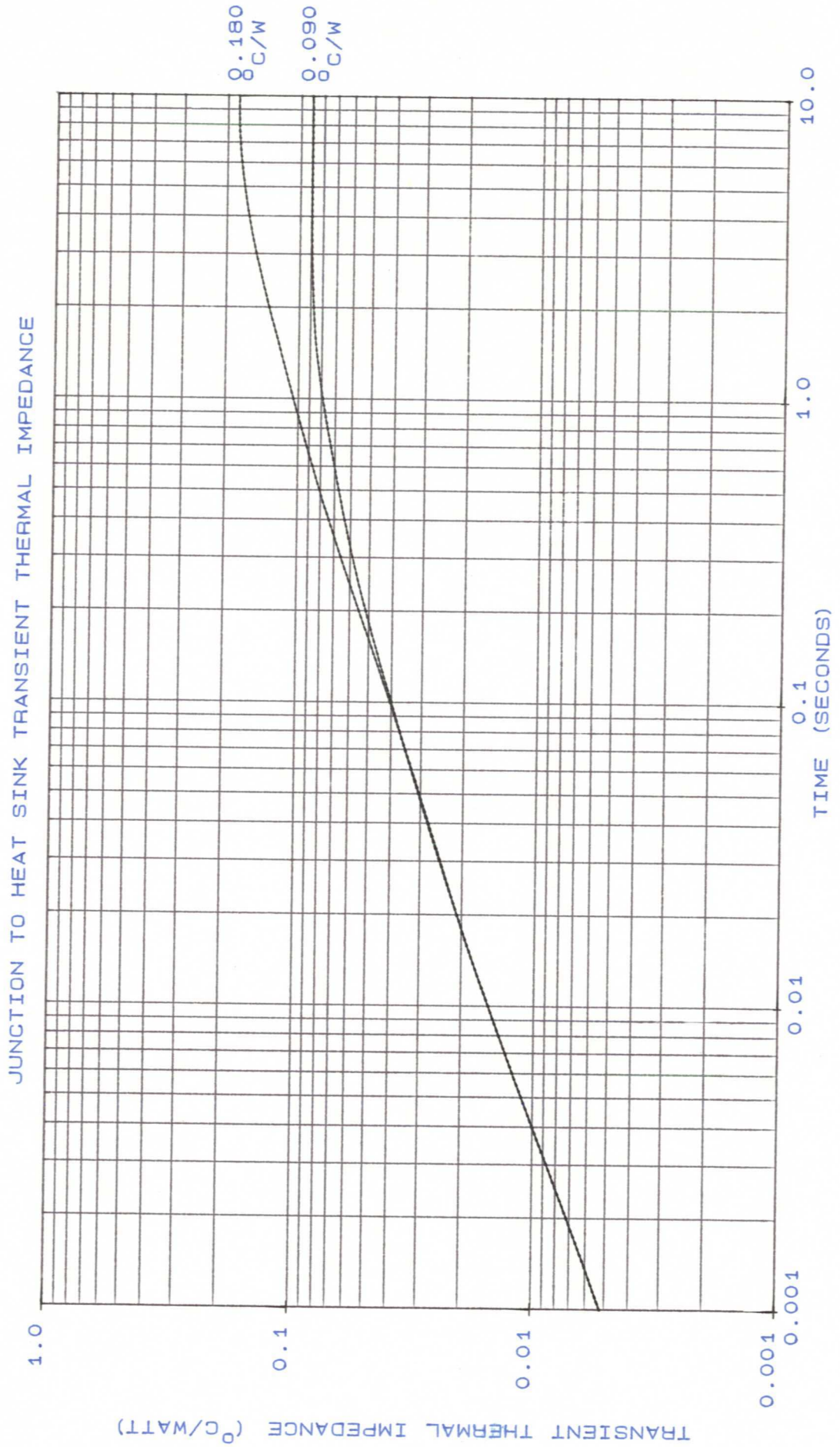
Let f be the operating frequency in Hz

Then $T_{SINK}^{(new)} = T_{SINK}(original) - E \times R_{th} \times f$

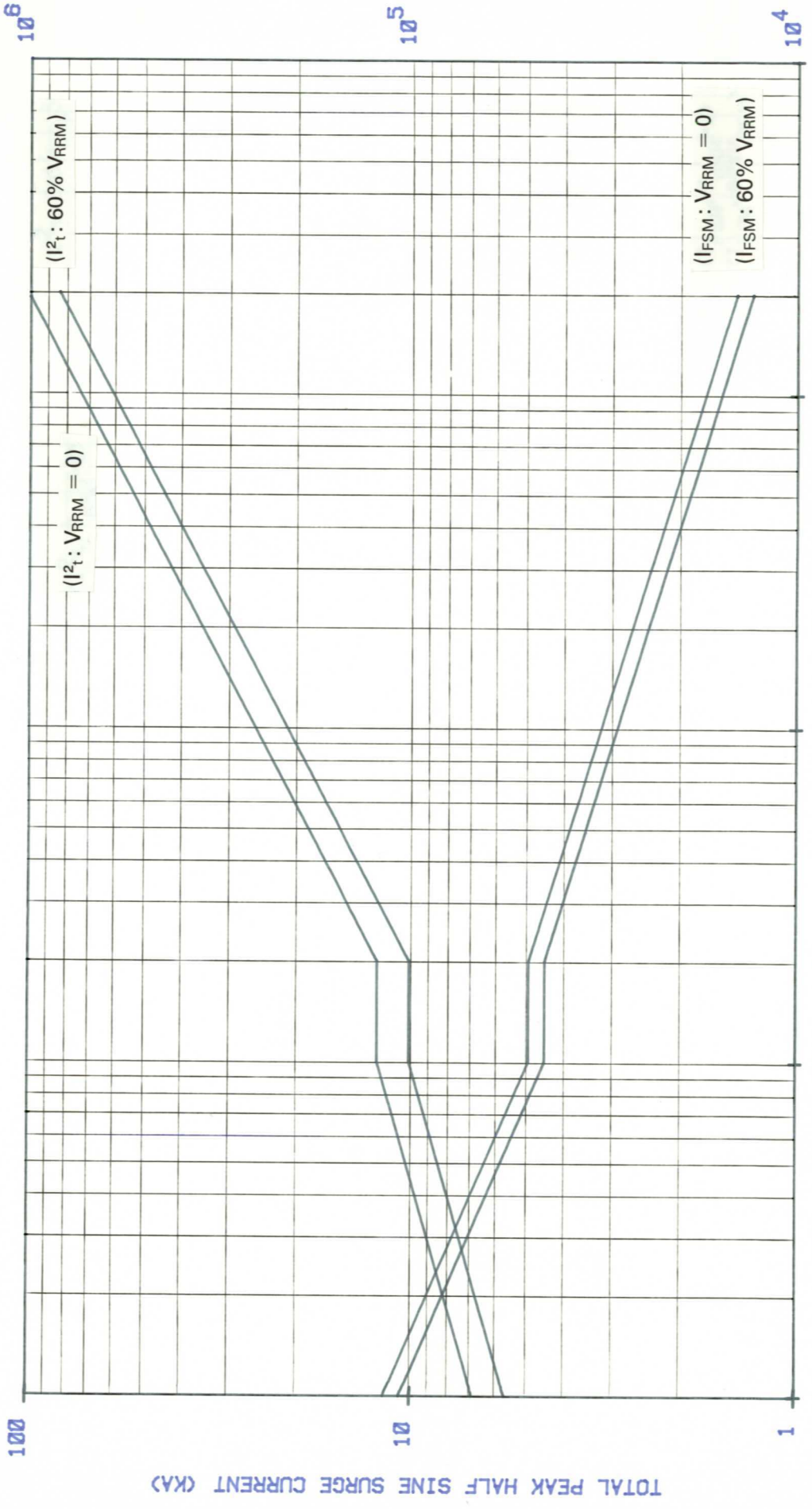
Where T_{SINK} new is the required maximum heat sink temperature and T_{SINK} original is the heat sink temperature given with the frequency ratings.

FORWARD CHARACTERISTIC OF LIMIT DEVICE

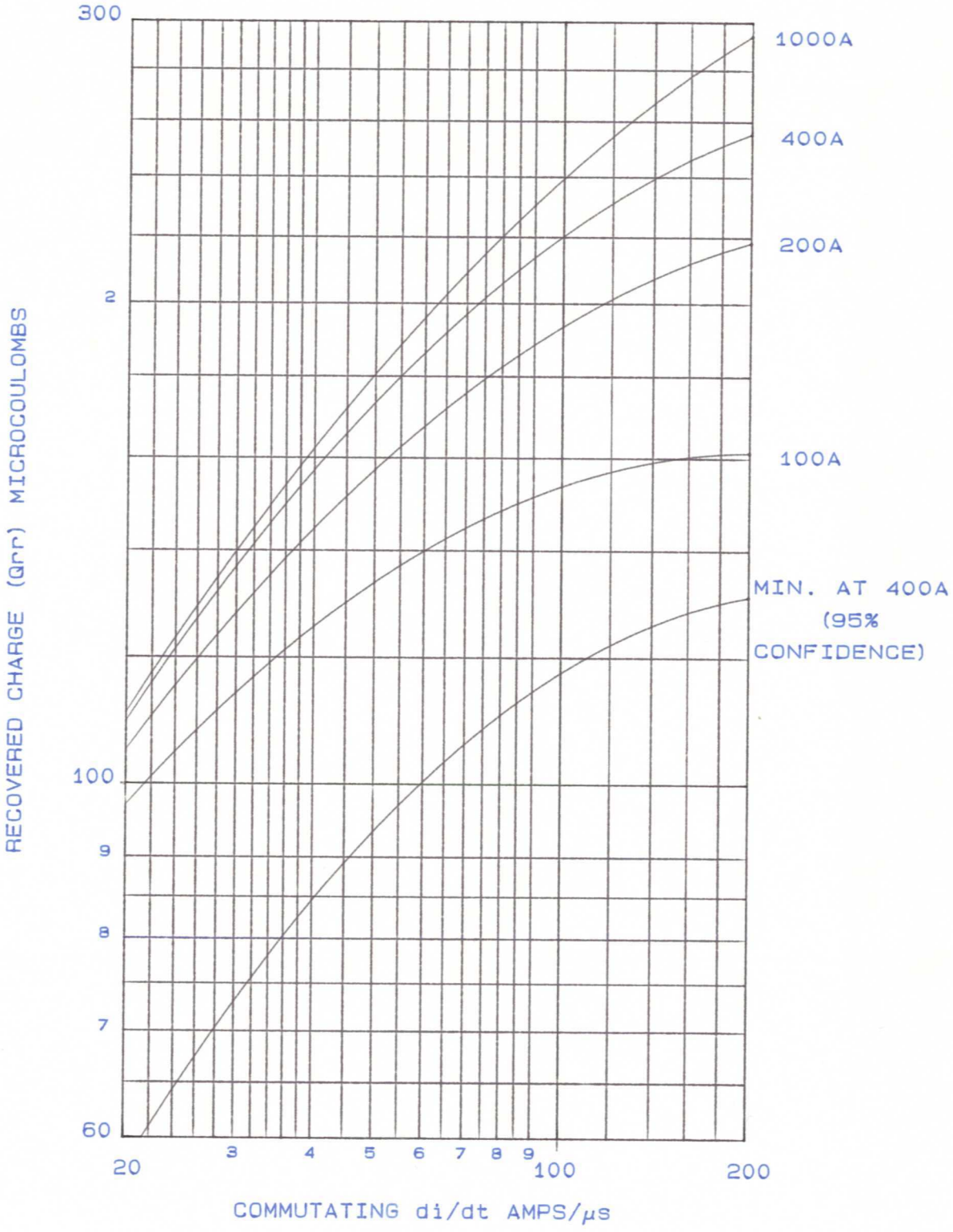


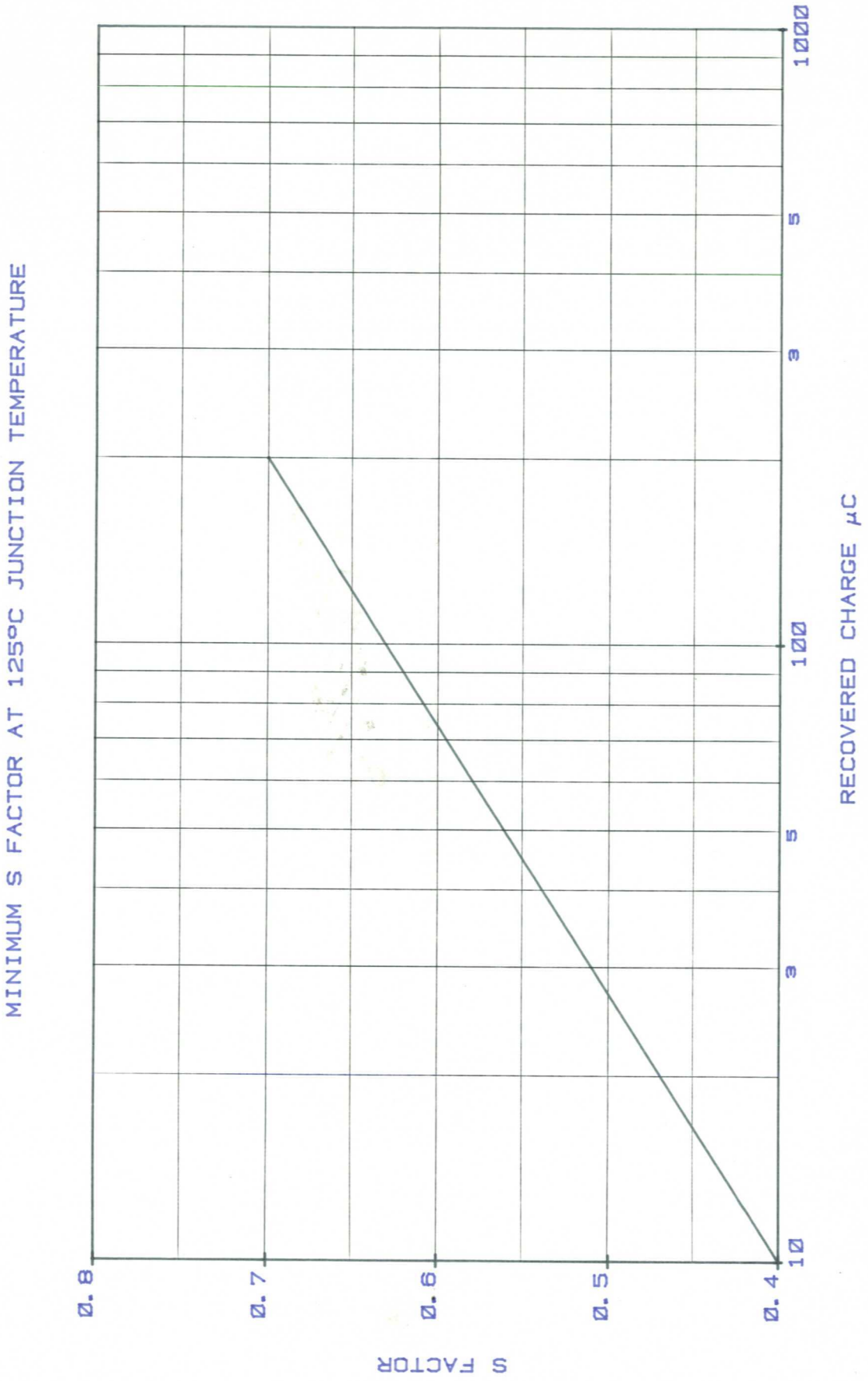

JUNCTION TO HEAT SINK TRANSIENT THERMAL IMPEDANCE
0.180 °C/W
0.090 °C/W
1.0
0.1
0.01
0.001
0.001
0.01
0.1
1.0
10.0
TRANSIENT THERMAL IMPEDANCE (°C/WATT)
TIME (SECONDS)

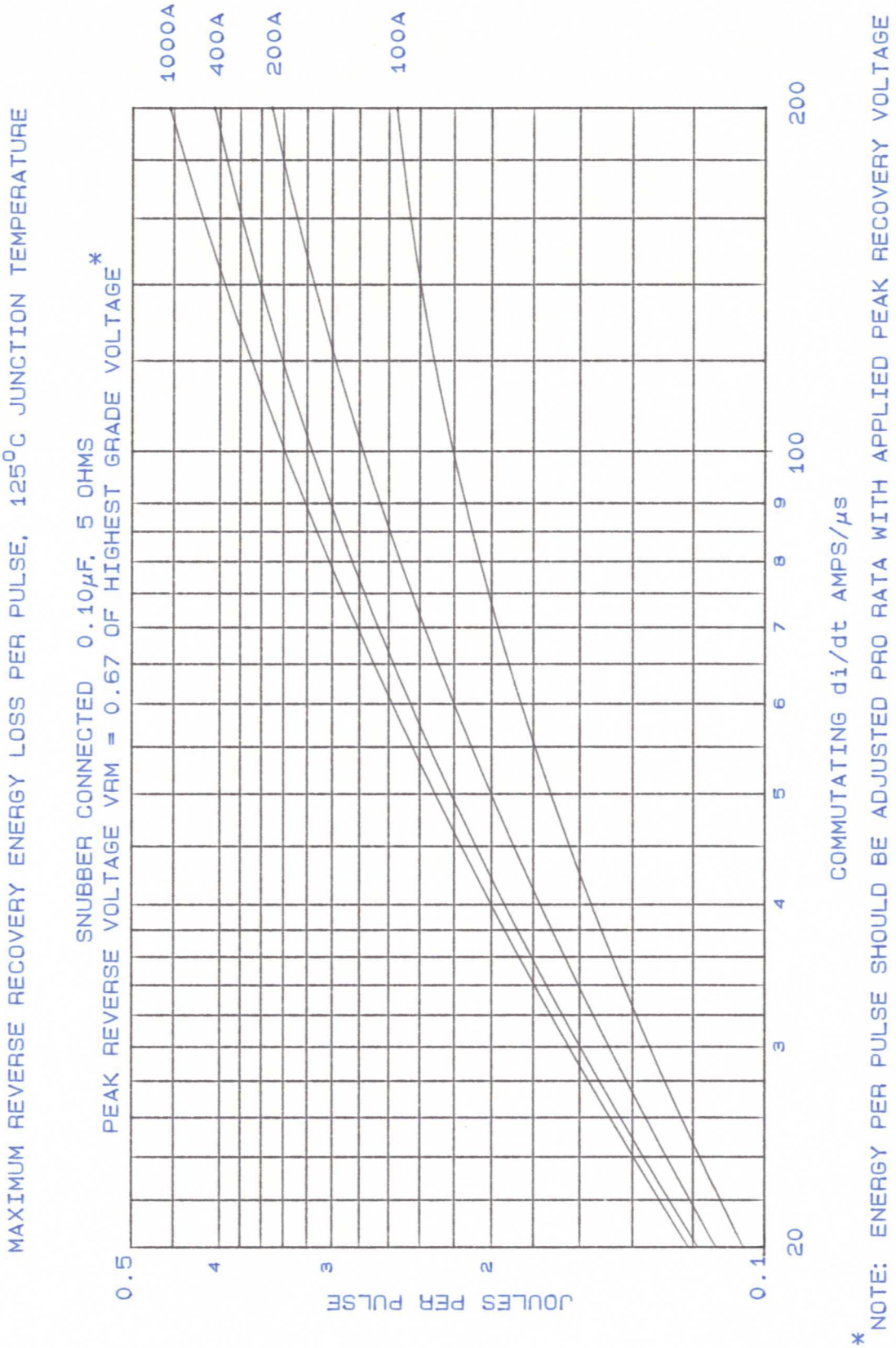
MAXIMUM NON REPETITIVE SURGE CURRENT AT INITIAL JUNCTION TEMPERATURE 125°C



MAXIMUM RECOVERED CHARGE AT 125°C JUNCTION TEMPERATURE

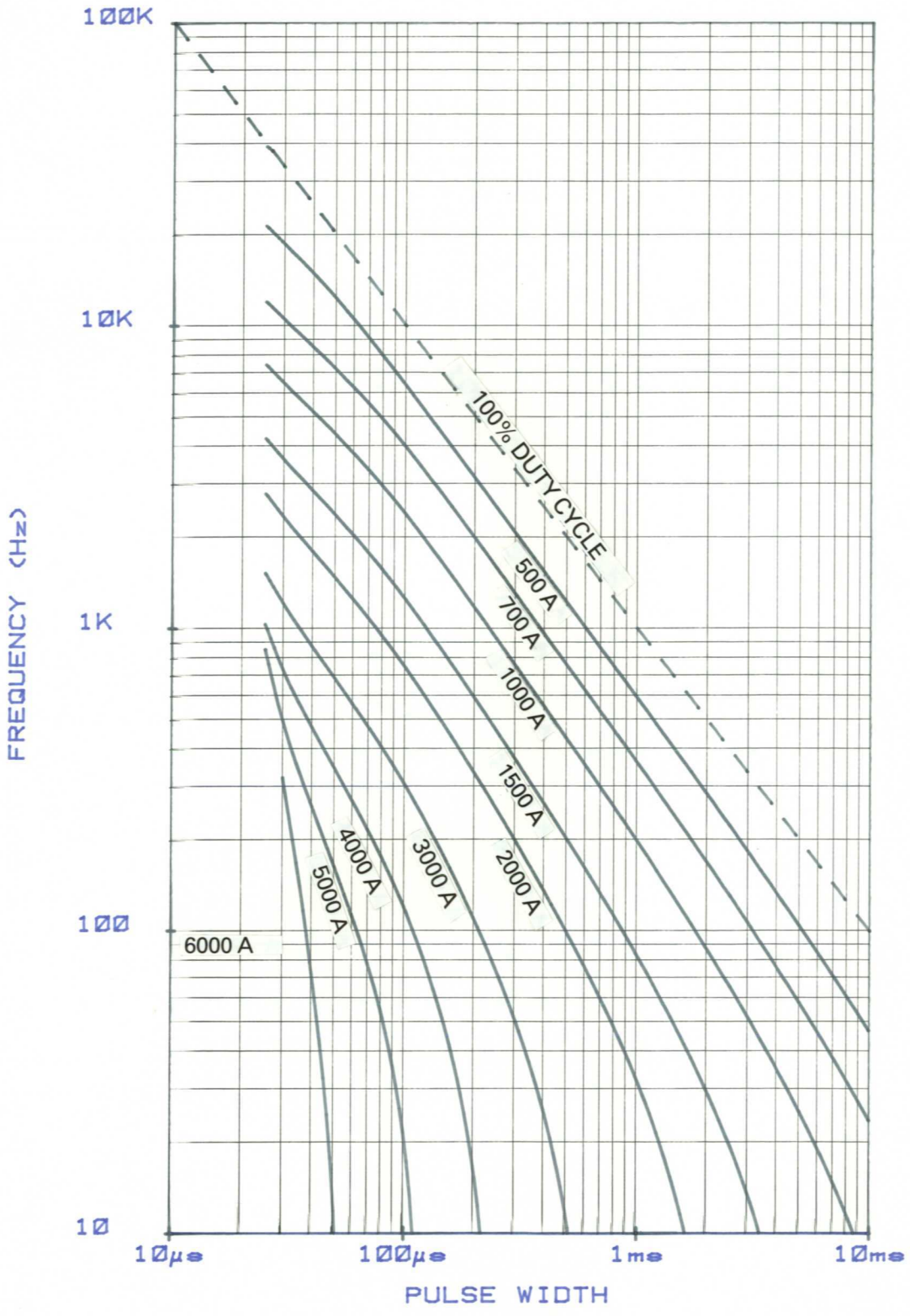



MINIMUM S FACTOR AT 125°C JUNCTION TEMPERATURE
S FACTOR
0.8
0.7
0.6
0.5
0.4
RECOVERED CHARGE µC
10
3
5
100
3
5
1000

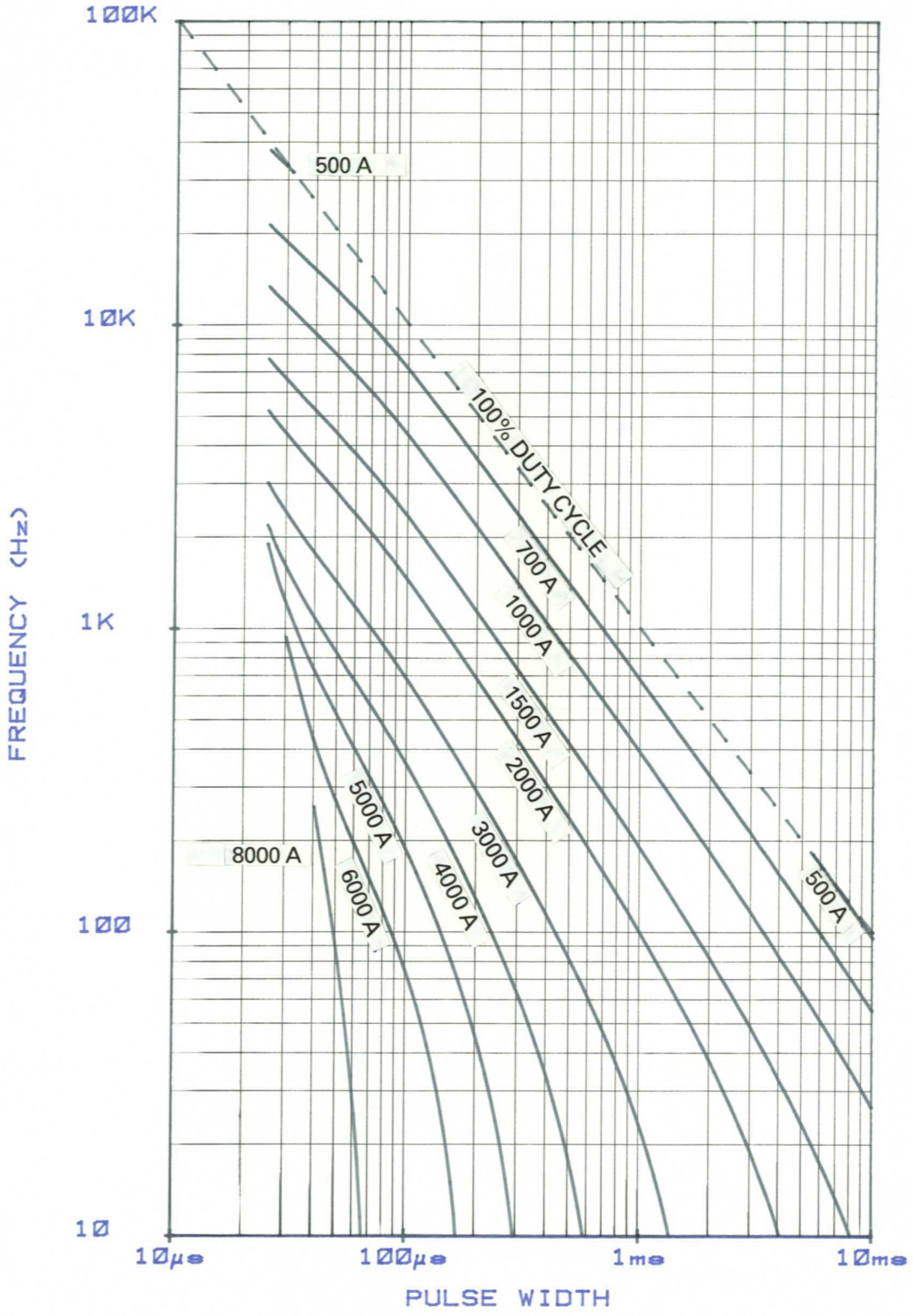


*NOTE: ENERGY PER PULSE SHOULD BE ADJUSTED PRO RATA WITH APPLIED PEAK RECOVERY VOLTAGE

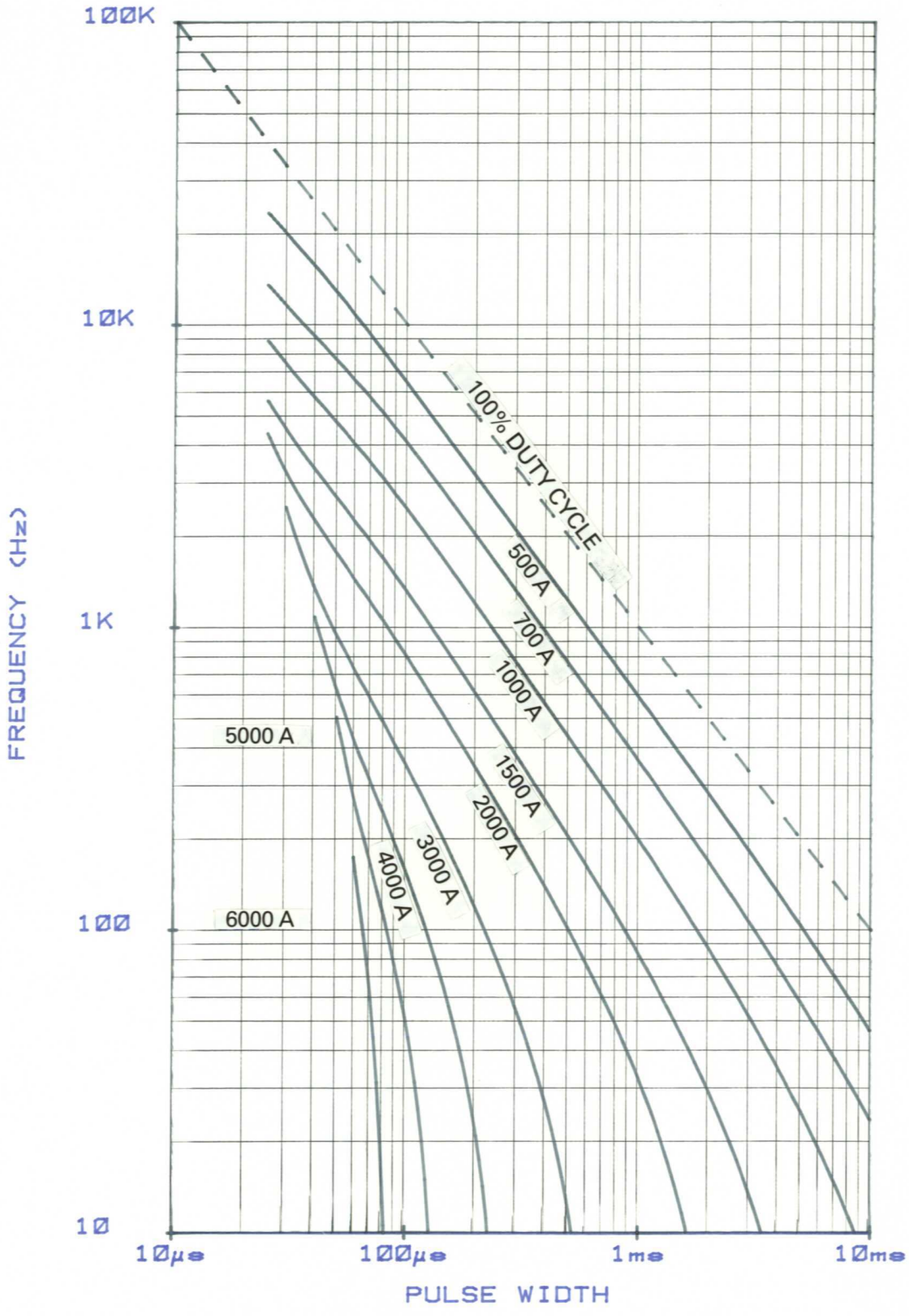
T SINK 85°C. 200A/μs



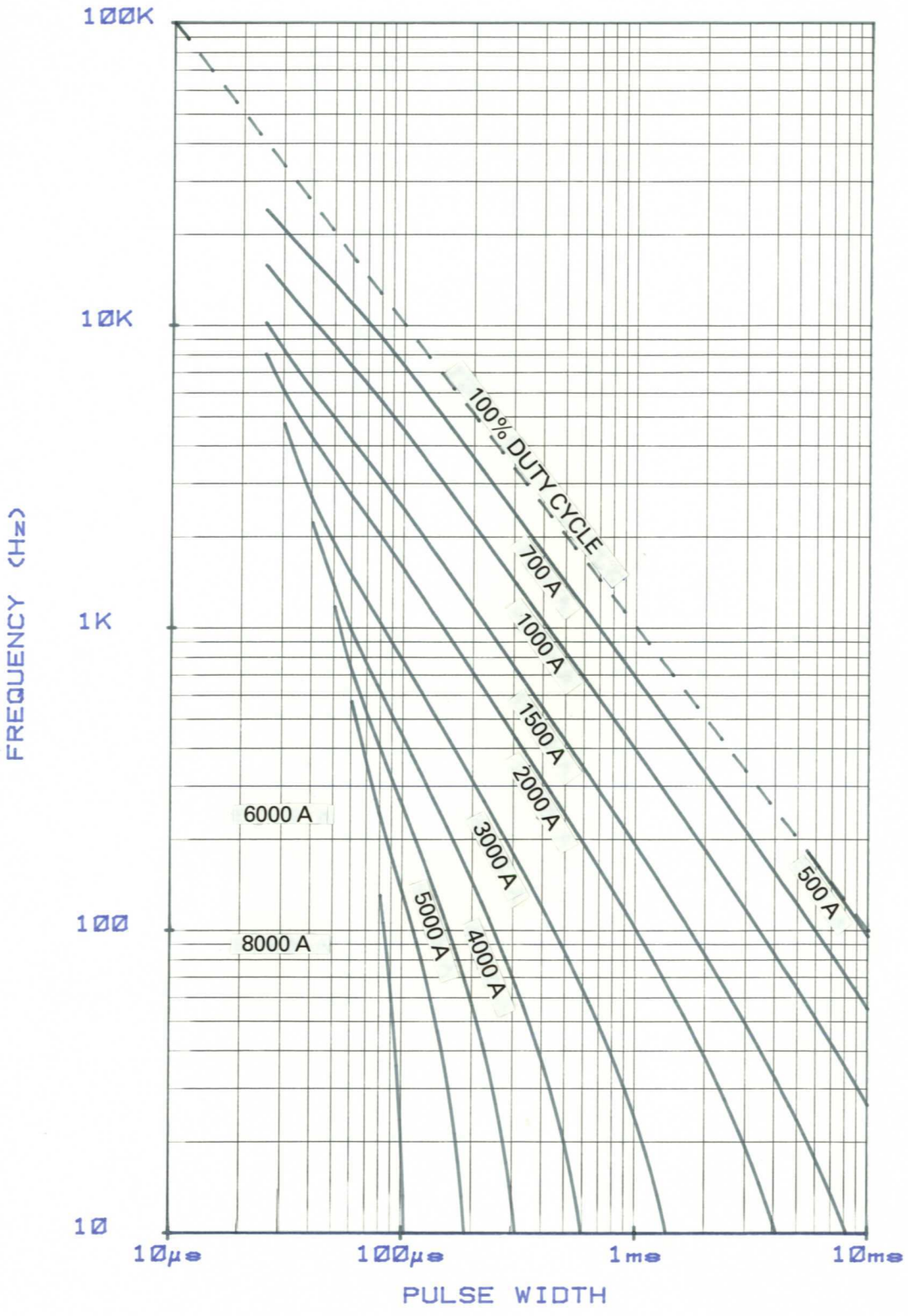
T SINK 55°C. 200A/μs



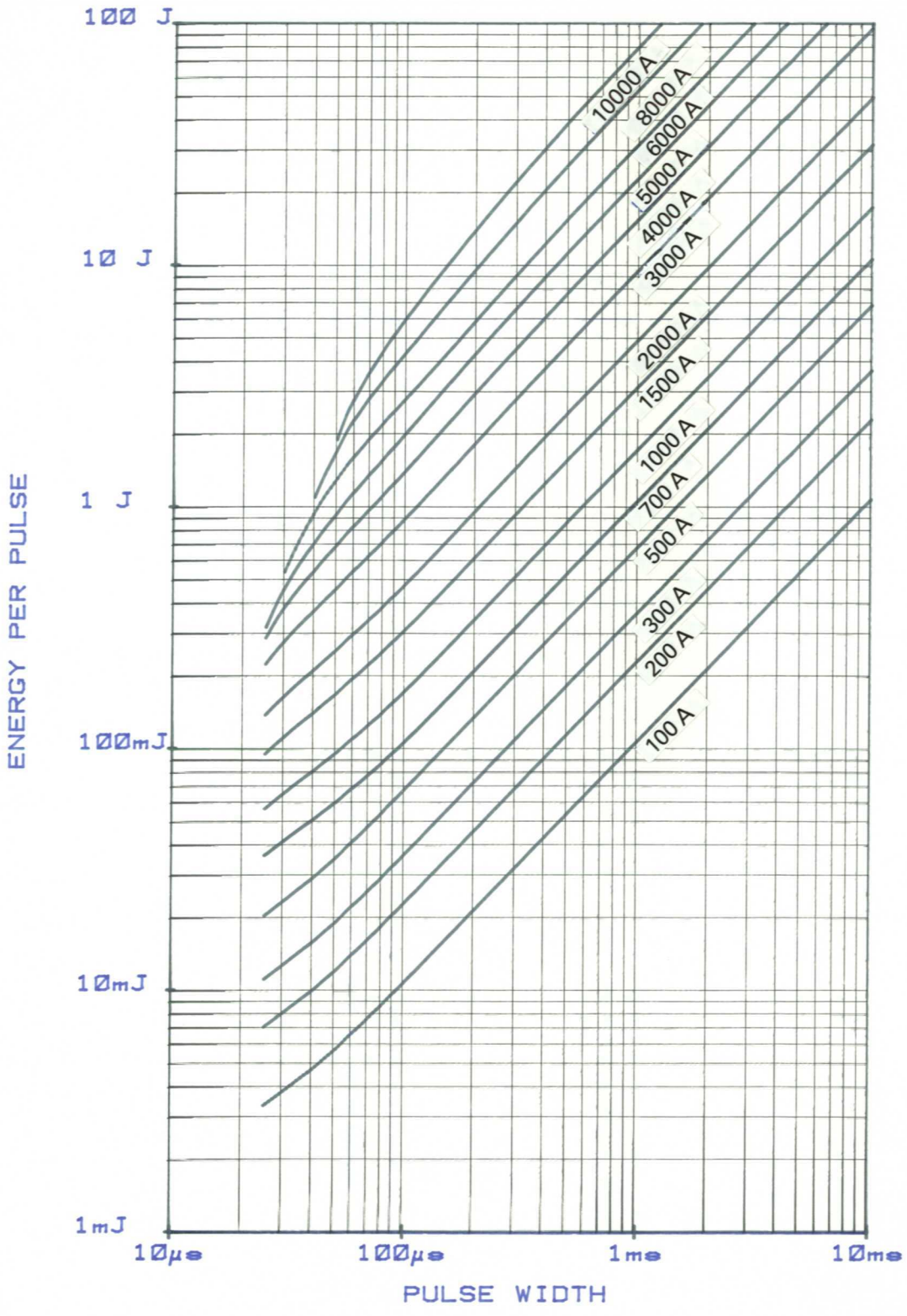
T SINK 85°C. 100A/µs



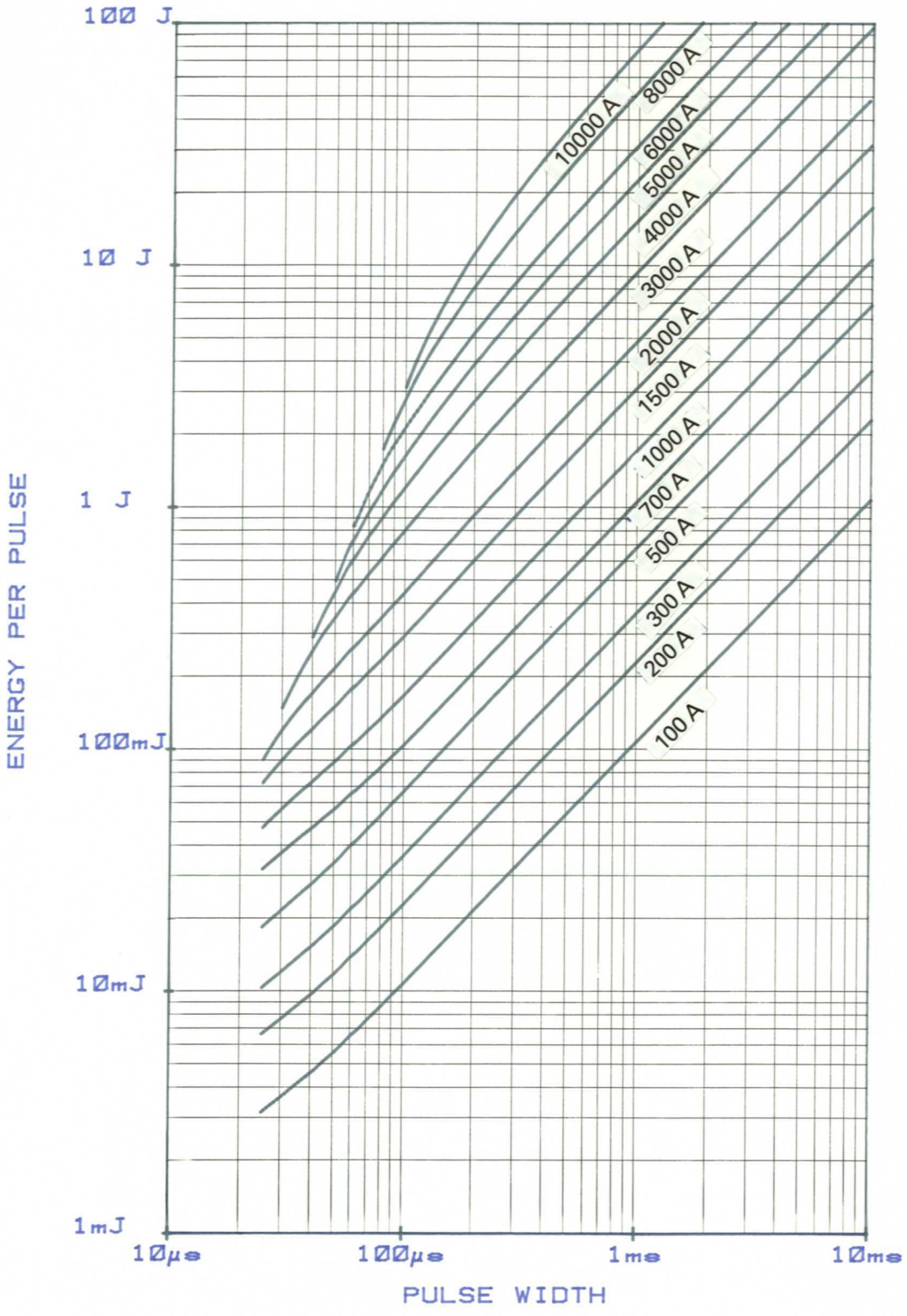
T SINK 55°C. 100A/μs



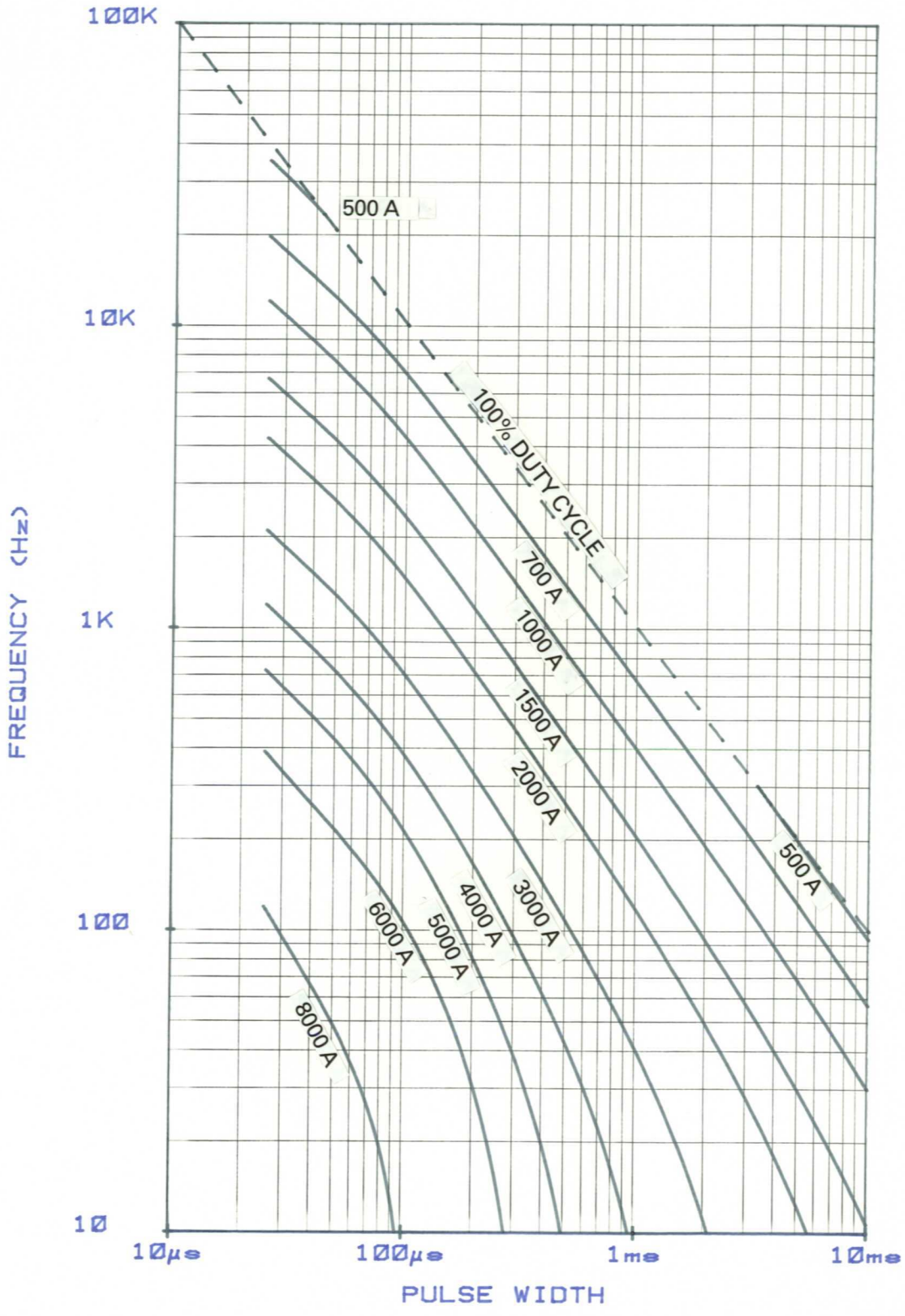
T_j 125°C. 200A/μs



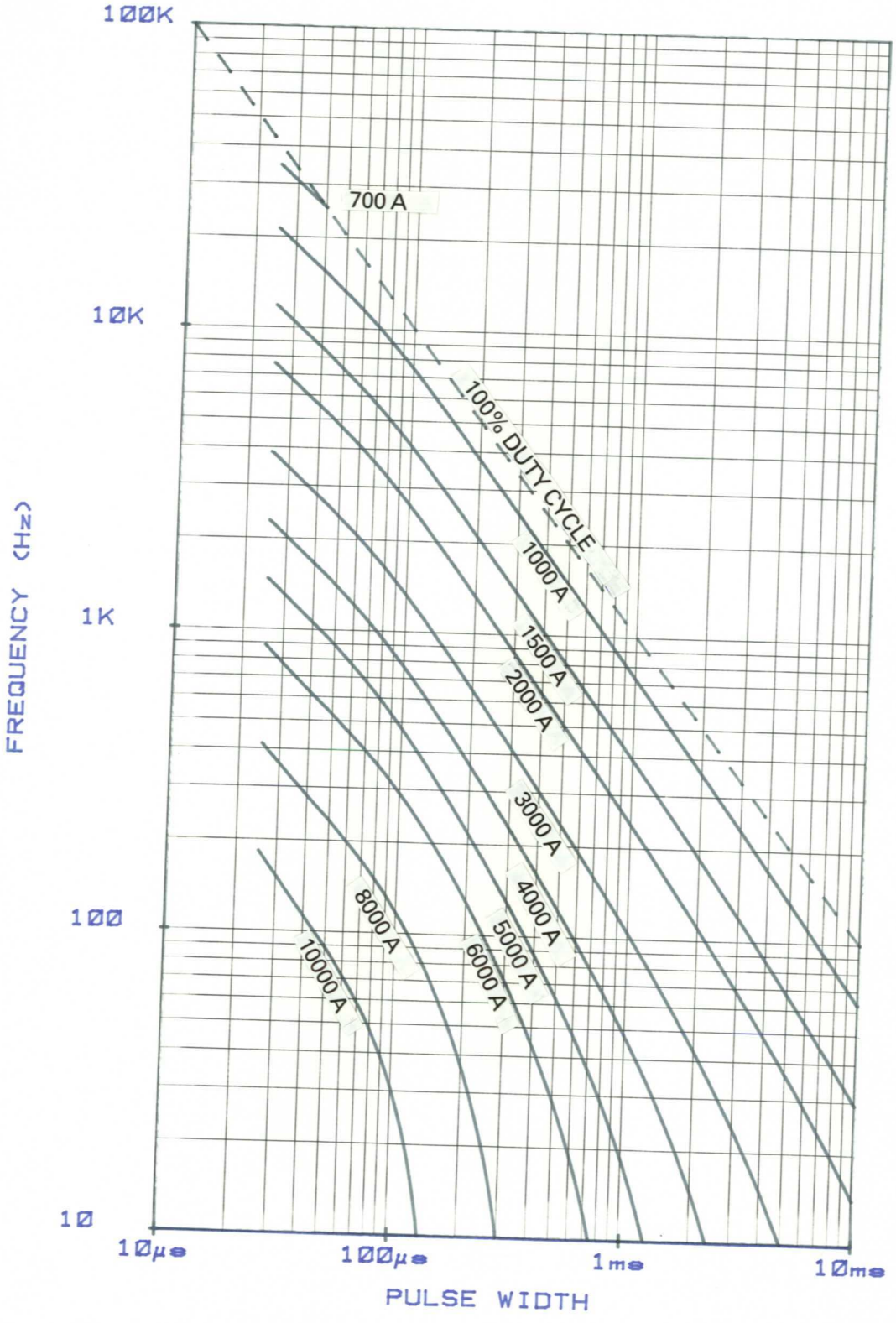
T_j 125°C. 100A/µs

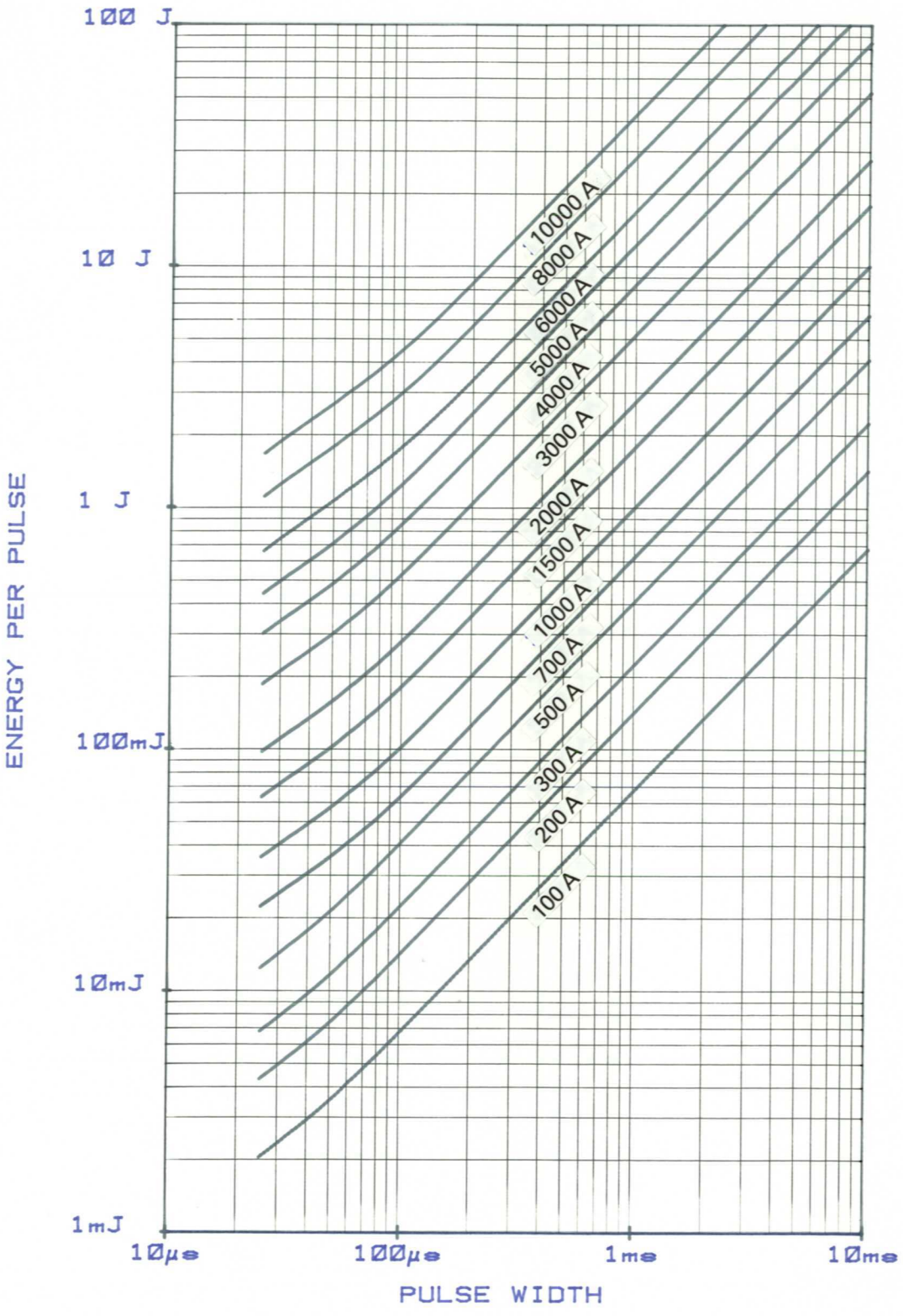


T SINK 85°C. SINE WAVE



T SINK 55°C. SINE WAVE




Tj 125°C. SINE WAVE
100 J
10 J
1 J
100mJ
10mJ
1mJ
ENERGY PER PULSE
10000 A
8000 A
6000 A
5000 A
4000 A
3000 A
2000 A
1500 A
1000 A
700 A
500 A
300 A
200 A
100 A
10µs
100µs
1ms
10ms
PULSE WIDTH

SCALE	1/1
DRN	
CHKD	
APPD	
A	
S	NI

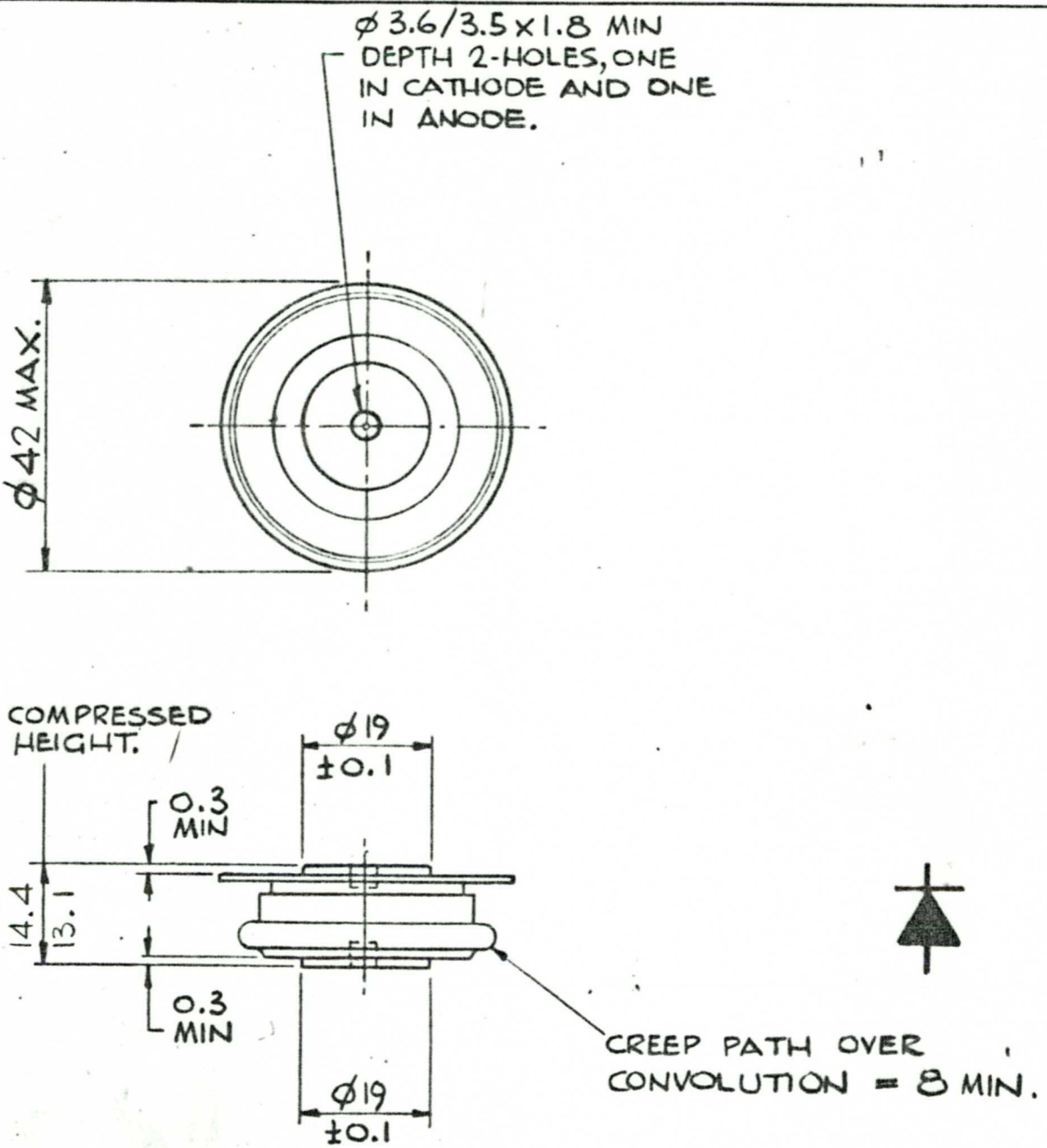
INTERNATIONAL OUTLINE No. DO-200AA.
WEIGHT. 70 GRAMS.
FINISH. NICKEL PLATE.

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

DEVICE MOUNTING: CLAMPING FORCE TO BE APPLIED ON ℄ OF LOCATION HOLES AND BE EVENLY DISTRIBUTED OVER AREA OF CONTACT. FLAT TOL ON SURFACES TO WHICH DEVICE IS CLAMPED TO BE 0.04 WIDE.
CLAMPING FORCE = 330 - 550kgf.

TYPE NUMBER	
CXC300	CXC170
CXC320	CXC174
CXC380	
CXC400	

G.A. DRG. No. 159B100H100-H110, 102B213.



WESTINGHOUSE BRAKE AND SIGNAL CO. LTD.
CHIPPENHAM, WILTSHIRE, SN15 1JD, ENGLAND.

WESTCODE ® SEMICONDUCTORS

THIRD ANGLE PROJECTION

DIMNS. IN MILLIMETRES

DRG. No. 100A241

ISS	REVISIONS
1	10.9.76 PIIB
2	REDRAWN. 15.2/14 WAS 15.2/12.5. ø19 WAS ø29. P304. 18.5.78
3	CLAMPING FORCE WAS 500-1200 kgf. 7.9.78
4	11.9.78 ø42 WAS ø43 14.35/13.08 WAS 15.2/14. CLAMP FORCE WAS 400-700kgf
5	19.9.78 14.4/13.1 WAS 14.35/13.08
6	30.10.78 M1670 TYPE Nº ADDED
7	17.9.79 M1773 550kgf WAS 700 kgf.