MILITARY SPECIFICATION

CV7572-79

SEMICONDUCTOR DEVICES, RECTIFIER DIODES

Description:- This Specification covers the detail requirements for Silicon Power Rectifier Diodes and is in accordance with K1007, Issue 3, except as otherwise stated.

Mechanical Dimensions and Outlines:- K1007 Section B, 10.3.3.3. Thread $\frac{1}{4}$-28 UNF 2A.

Connections:- Stud cathode CV7572 to CV7575
Stud anode CV7576 to CV7579

Device	Rating	V_{RRM} and V_{RWM}	V_{RSM}	V_R	I_O	I_{FSM}	I_{FRM}	T_{Stud}	T_{Stg}	Vib.	Shock	Mounting Torque
	Unit	V	V	V	A	A	A	°C	°C	g	g	(lb. ins.)
CV7572	Min.								-65			20
CV7576	Max.	200	275	160	60		300	140	150	20	1500	25
CV7573	Min.								-65			20
CV7577	Max.	600	725	480	60		300	140	150	20	1500	25
CV7574	Min.								-65			20
CV7578	Max.	800	950	650	60		300	140	150	20	1500	25
CV7575	Min.								-65			20
CV7579	Max.	1000	1250	800	60		300	140	150	20	1500	25
Notes			A		B	C	D				E	F

Notes:
A. Max. non-repetitive transient voltage not exceeding 5 mS duration.
B. See derating curve page 10.
C. See curve on page 11.
D. For max. duty cycle of 17%.
E. Max. duration = 0.5 mS.
F. With clean dry thread.
G. Commercial equivalents 25G and 25GR series.

CV7572-79

Primary Electrical Characteristics

Characteristic		V_F	I_{RRM}	I_{RRM}
Unit		V	mA	mA
CV7572 CV7576	Max.	1.2	20	25
CV7573 CV7577	Max.	1.2	10	15
CV7574 CV7578	Max.	1.2	7	10
CV7575 CV7579	Max.	1.2	7	10
Conditions	T_{STUD} °C	25	25	140
	I_F A	60		
	V_R V		Max. rated V_{RRM}	Max. rated V_{RRM}

Requirements:-

Marking. The device shall be marked in accordance with K1007, Issue 3, Section B.1.3.4.

Quality Assurance Provisions:-

Destructive Tests. The tests listed in Table II, Group B Inspection, Sub-Group 2, 3 and 4 and in Table III, Group C Inspection, Sub-Group 2 are considered destructive.

Group C Inspection. Inspection shall be conducted on the initial lot and thereafter every 90 days or every fifth lot whichever occurs first.

Preparation of Delivery:-

Packaging. The devices shall be packed according to K1007, Section A.1.2.(c). Nut and lock-washer to be packed with each device.

NATO Stock Numbers:-

CV7572	-	5960-99-037-3832
CV7573	-	5960-99-037-3833
CV7574	-	5960-99-037-3834
CV7575	-	5960-99-037-3835
CV7576	-	5960-99-037-3836
CV7577	-	5960-99-037-3837
CV7578	-	5960-99-037-3838
CV7579	-	5960-99-037-3839

This Specification has been prepared by and the Qualification Approval Authority is:-

Admiralty Surface Weapons Establishment,
Portsdown, Cosham,
Portsmouth, Hants.,
England.

Table I

GROUP A INSPECTION

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
SUB-GROUP 1			0.65	I				
Visual and Mechanical Inspection.	5.1.1							
SUB-GROUP 2			0.65	II				
Forward Voltage	8A.3.2	I_F = 60 amps Test to be completed within 5 secs. Diode stud to be maintained at 25°C.			V_F	-	1.2	V
Reverse Current (1)	8A.2.2	Oscilloscope Method			I_{RRM}	-		
		V_{RRM}				-		
		CV7572 and CV7576 200V				-	20	mA
		CV7573 and CV7577 600V				-	10	mA
		CV7574 and CV7578 800V				-	7	mA
		CV7575 and CV7579 1000V				-	7	mA
SUB-GROUP 3			2.5	I				
Reverse Current (2)	8A.2.2	Oscilloscope Method T_{stud} = 140°C			I_{RRM}			
		V_{RRM}						
		CV7572 and CV7576 200V					25	mA
		CV7573 and CV7577 600V					15	mA
		CV7574 and CV7578 800V					10	mA
		CV7575 and CV7579 1000V					10	mA

Table II

GROUP B INSPECTION

See Page 3 Quality Assurance Provisions

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
SUB-GROUP 1			6.5	IC				
Physical Dimensions	5.1	In accordance with Drawing 10.3.3.3						
SUB-GROUP 2			6.5	IA				
Temperature Cycling	5.5	-65°C to +150°C						
Moisture Resistance	5.3							
SUB-GROUP 3			6.5	IA				
Vibration Fatigue	5.15.1	20g: non-operating						
SUB-GROUP 4			6.5	IC				
Torque (Stud)	5.12.1	Non-operating 25lb. ins.						
SUB-GROUP 5, 6								
Omitted								
SUB-GROUP 7			6.5	I				
High Temperature Life	6.2.1 6.6.1.2	Non-operating T_{amb} = 150°C. t = 1,000 hours.						

Table II

GROUP B INSPECTION (CONTD.)

Examination or Test	Test Conditions: K1007/ NATO Ref.	Test Conditions: Specific Conditions	AQL %	Insp. Level	Symbol	Limits: Min.	Limits: Max.	Units
SUB-GROUP 8	6.3.3	V_{RWM} = max. rated value.						
Operation Life	6.3.3.2	T_{stud} at any single temperature between 110°C and 135°C I_O = max. value given by derating curve on page 10 according to the chosen T_{stud}. See also pages 8 and 9.						
Post Test End Points for Sub-Groups 2, 3, 7 and 8								
Forward voltage	8A.3.2	As for Group A, Sub-Group 2			V_F	-	1.3	V
Reverse Current (1)	8A.2.2	As for Group A, Sub-Group 2			I_{RRM}	-		
		CV7572 and CV6576					40	mA
		CV7573 and CV7577					20	mA
		CV7574 and CV7578					15	mA
		CV7575 and CV7579					15	mA

Table III

GROUP C INSPECTION

See Page 3 Quality Assurance Provisions

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
SUB-GROUP 1								
Omitted.								
SUB-GROUP 2			6.5	IA				
Shock	5.17	Non-operating. Five blows in each of two directions Y_2 and X_1.						
Constant Acceleration	5.14	Non-operating. In the Y_2 direction (along axis, stud outwards) 5,000g.						
Post Test End Points for Sub-Group 2								
Forward Voltage	8A.3.2	As for Group A, Sub-Group 2.			V_F		1.3	V
Reverse Current (1)	8A.2.2	As for Group A, Sub-Group 2.			I_{RRM}			
		CV7572 and CV7576					40	mA
		CV7573 and CV7577					20	mA
		CV7574 and CV7578					15	mA
		CV7575 and CV7579					15	mA

LIFE TEST PROCEDURE

Inspection Level

For lot sizes up to 200, at least one rectifier shall be taken from each lot and life tested for 1,000 hours. For lot sizes 201 and over, at least two rectifiers shall be taken from each lot and life tested for 1,000 hours.

Merit Life

Merit Life is defined as the ratio of the actual life hours for one or more rectifiers to the total life hours that would have occurred had there been no failures, expressed as a percentage:-

$$\text{Merit Life} = \frac{\text{actual hours run}}{\text{total possible hours}} \times 100\%$$

Classification of Failures

Electrical inoperatives shall be the criterion of failure, and the life test positions shall be so arranged as to indicate a failure when it occurs. If a failure occurs, the number of hours run when the rectifier was last recorded as operating shall be taken as the actual life. At the end of the 1,000 hour period the same sample shall pass the post test end point limits.

Procedure of Continuous Production

When 1,000 hours have elapsed since the sample drawn from the first lot was placed on life test, there should be at least four additional samples undergoing life test, with various numbers of hours on test. The Merit Life shall be computed for the first five lots. If the Merit Life exceeds 90% the first lot is acceptable. When 1,000 hours have elapsed since the sample from the second lot was placed on life test, the Merit Life shall be computed using the test results from the first five lots. If this exceeds 90% the second lot is acceptable. The acceptability of the third, fourth and fifth lots is determined from the first five lots.

If, when the sample from one of the first five lots have been life tested for 1,000 hours, the computed Merit Life is 90% or less, the lot from which the sample was drawn shall be held in store. If when the sample from the subsequent lot has been life tested for 1,000 hours, the computed Merit Life exceeds 90%, both lots shall be accepted. If the Merit Life is 90% or less, both lots shall be held. When the sample from the fifth lot has been life tested for 1,000 hours, if the computed Merit Life for all five samples exceed 90% all lots being held shall be accepted. If the Merit Life is 90% or less, all lots being held shall be rejected.

When the sample from the sixth lot has been life tested for 1,000 hours, the Merit Life shall be computed for the samples from lots 2 to 6. If this exceeds 90%, lot 6 shall be accepted: if it is 90% or less, lot 6 shall be rejected. A similar procedure shall apply for subsequent lots, the Merit Life being computed on the combined results of the completed life test of the lot under consideration and the previous consecutive lots.

When any sample has passed the prescribed life test period or has failed it shall be removed from test.

Reduced Duration

When five consecutive lots have been accepted without any of them having been held due to failure to meet the 90% Merit Life requirement, reduced duration life testing is applicable, and the Merit Life shall then be computed after the sample from a lot has been life tested for 240 hours. If when a sample from a given lot has been life tested for 240 hours the computed Merit Life is 90% or less, the lot shall be held in store and the life test of that sample and subsequent samples shall continue to 1,000 hours, the Merit Life being computed after 1,000 hours for each sample. Reduced duration testing shall be again applicable after five consecutive lots have been accepted.

Single Lot or Non-Continuous Production

If production is not continuous (see section 6.6) the above procedure cannot be used. In this case the manufacturer shall place at least five rectifiers on life test from a given lot. After 1,000 hours the Merit Life for the sample shall be computed and if this exceeds 90% the lot shall be accepted. If it is 90% or less the lot shall be rejected.

If production is continuous, (section 6.6), but an interval of more than one week occurs between any two lots at the start of a production run, either the manufacturer shall place additional rectifiers on life test from one or more lots, or lots shall be held in store for a period after the sample has completed 1,000 hours of life test, so that the Merit Life is computed from the results of life test on not less than five rectifiers before a determination of acceptability is made.

Additional Samples

The manufacturer may place on life test any number of additional samples from each lot, provided the minimum requirement of 1, 2 or 5 as the case may be is met. In addition, after the life test has started for any lot, the manufacturer may add an additional quantity to the initial life test sample, but this may be done once only for any life test lot.

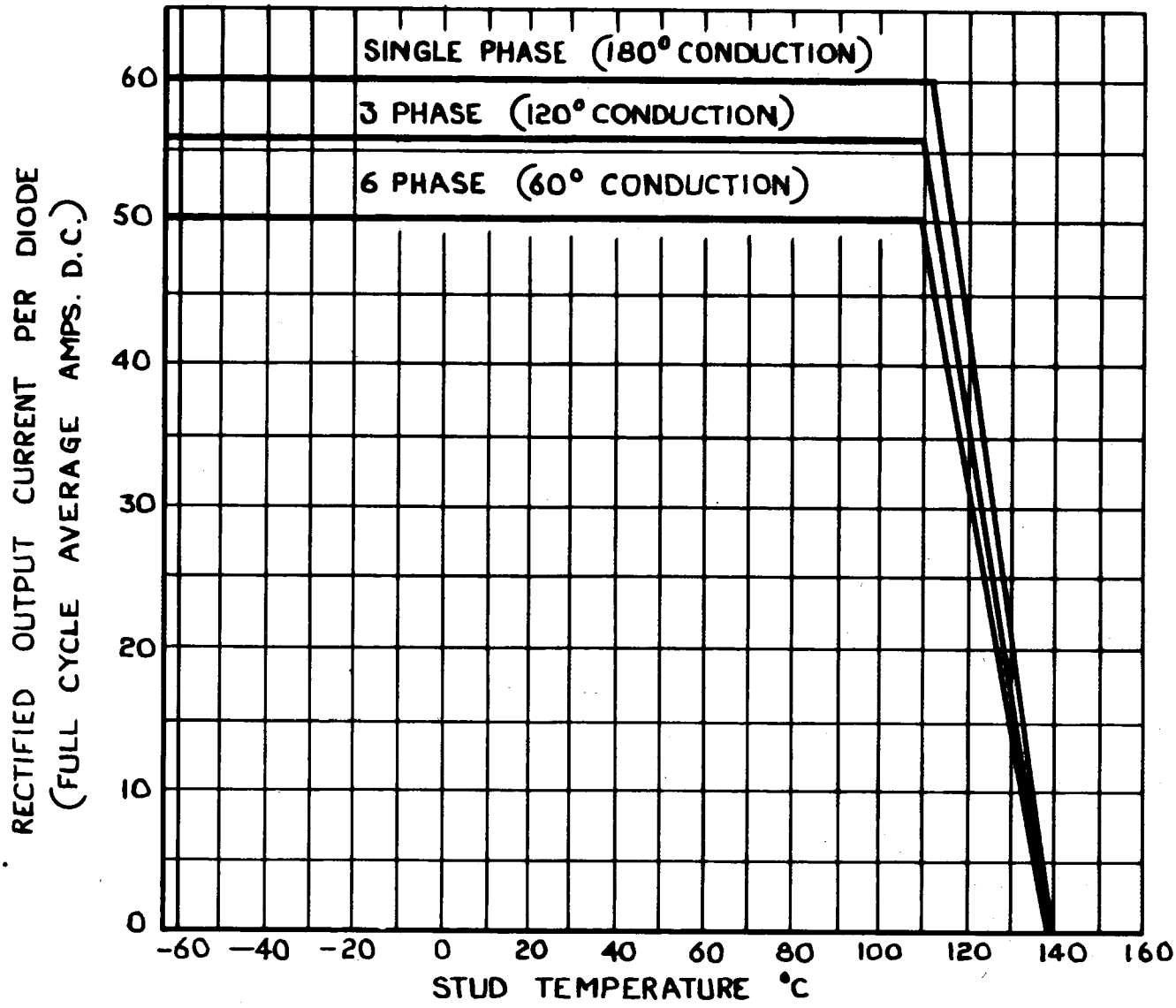


FIG. 1. CURRENT DERATING CURVE

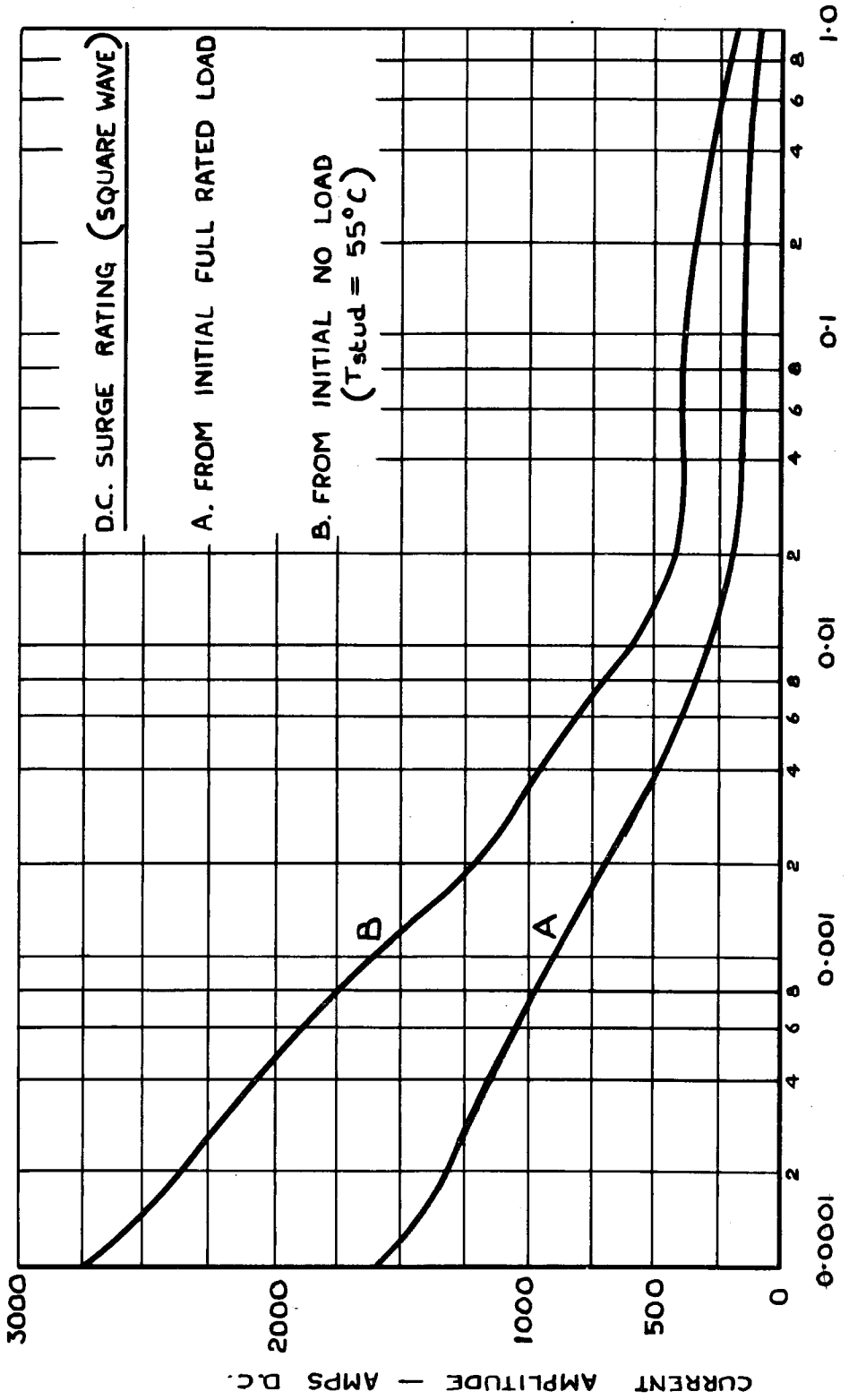


FIG. 2. FORWARD SURGE CURRENT DERATING CURVE

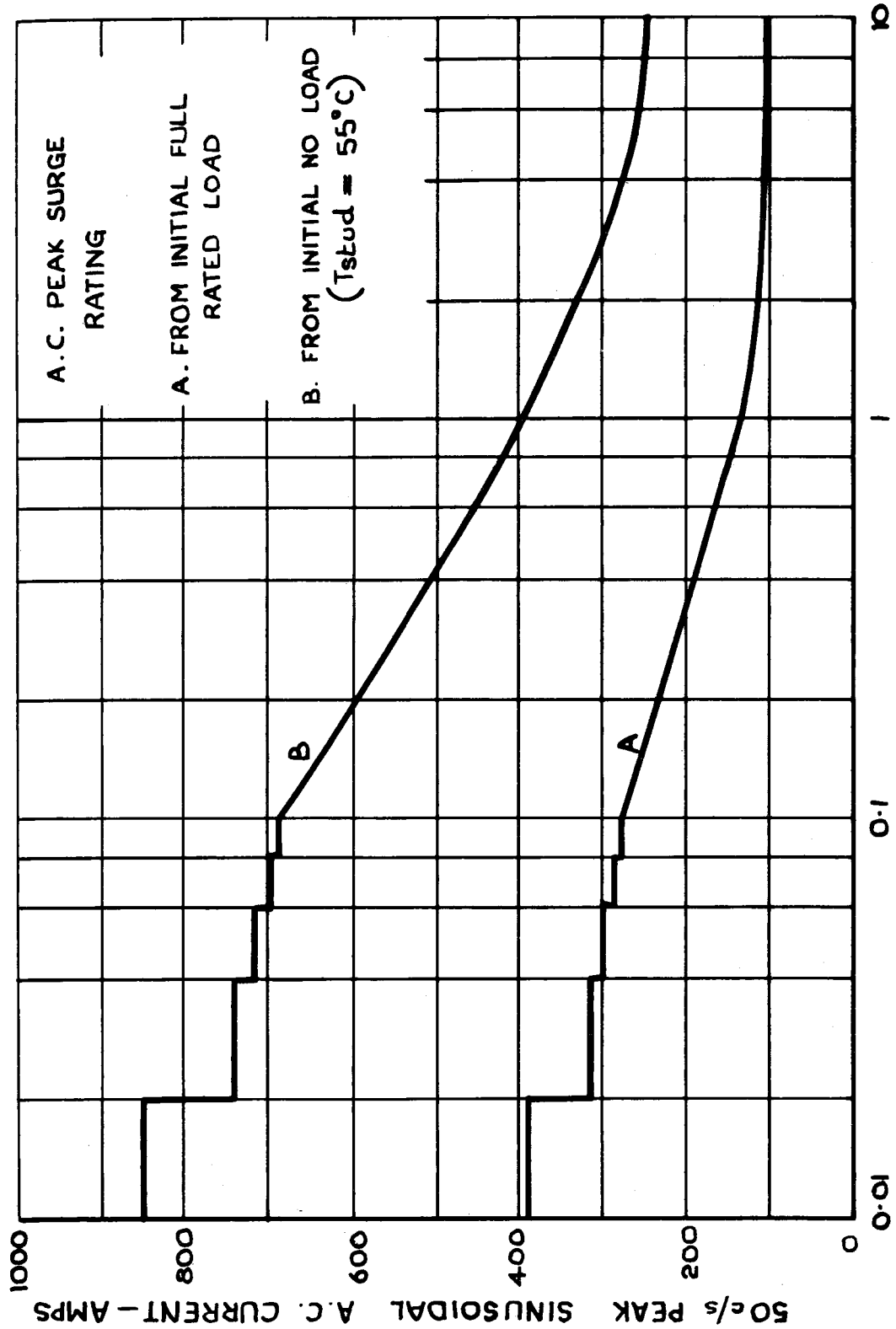


FIG. 3. A.C. PEAK SURGE DERATING CURVE

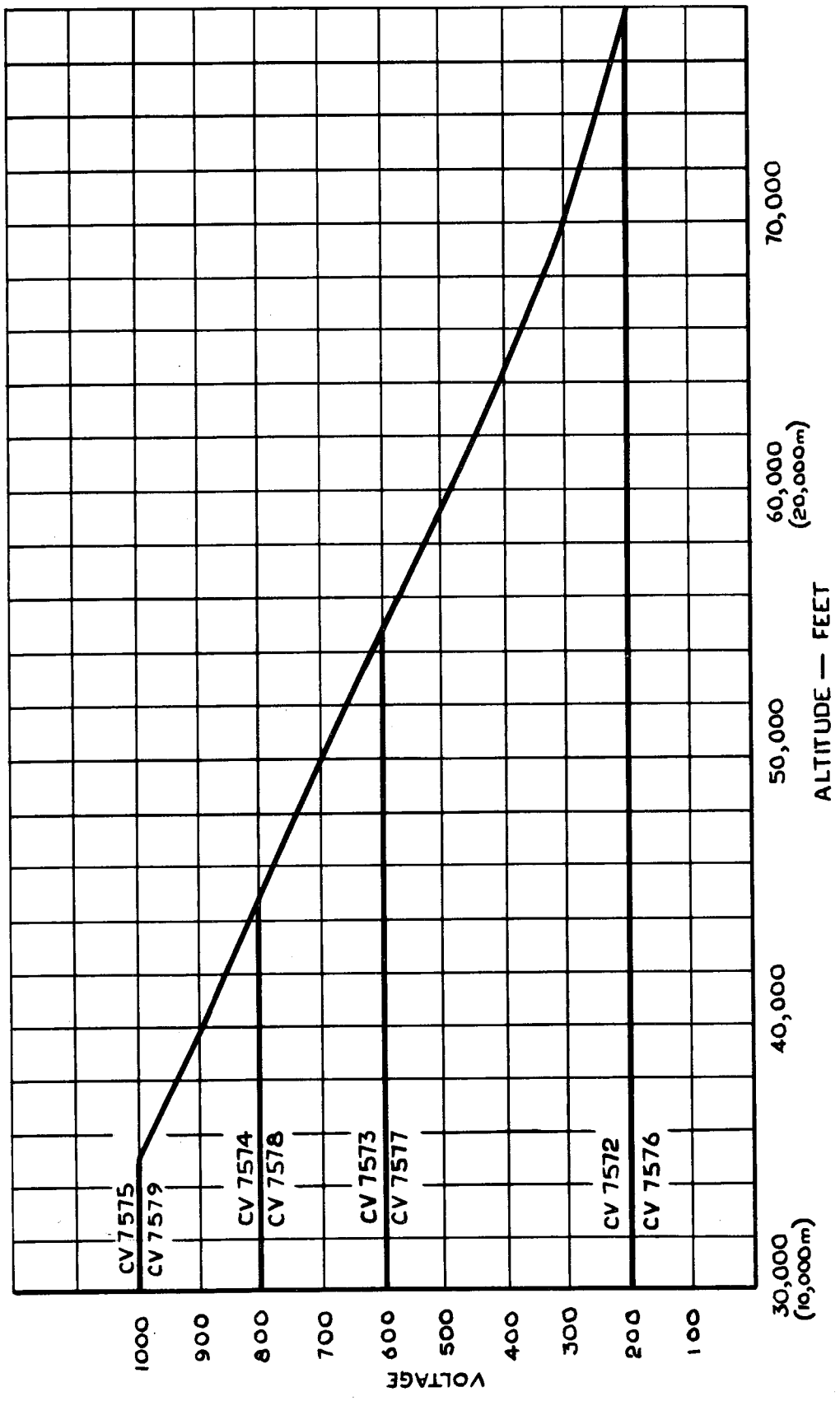


FIG. 4. VOLTAGE DERATING Vs. ALTITUDE.
(100% SAFETY FACTOR ON FLASH-OVER VOLTS)

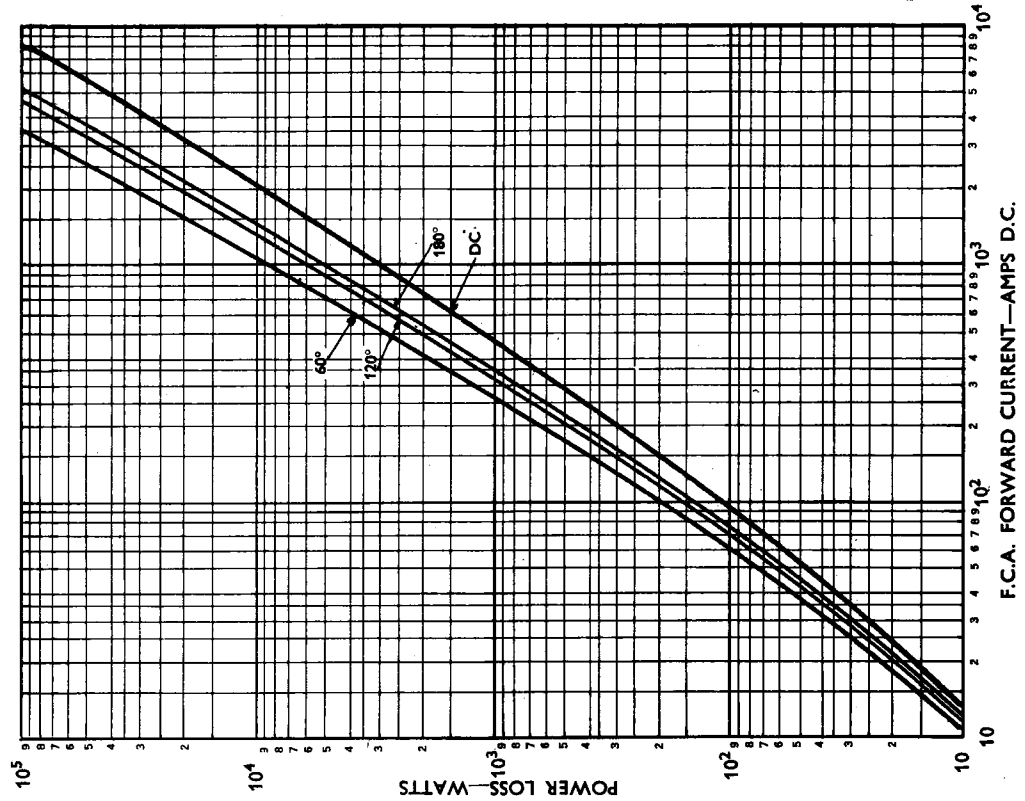


FIG.6 FORWARD POWER LOSS
HIGH LEVEL

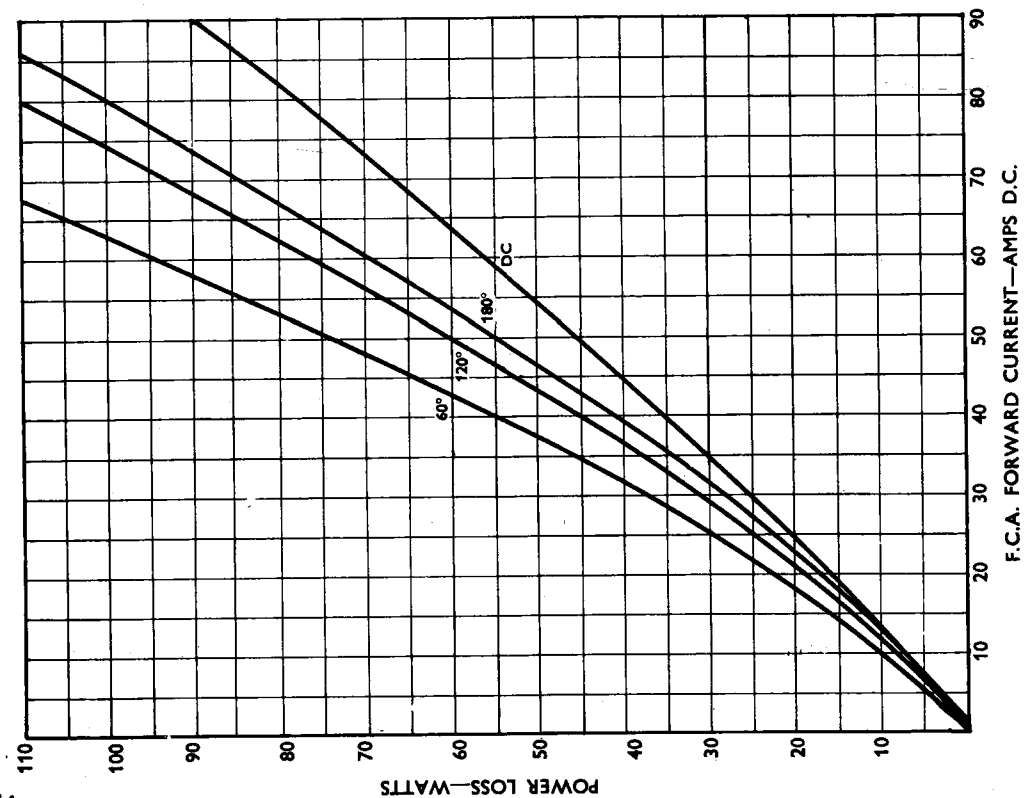


FIG.5 FORWARD POWER LOSS
LOW LEVEL

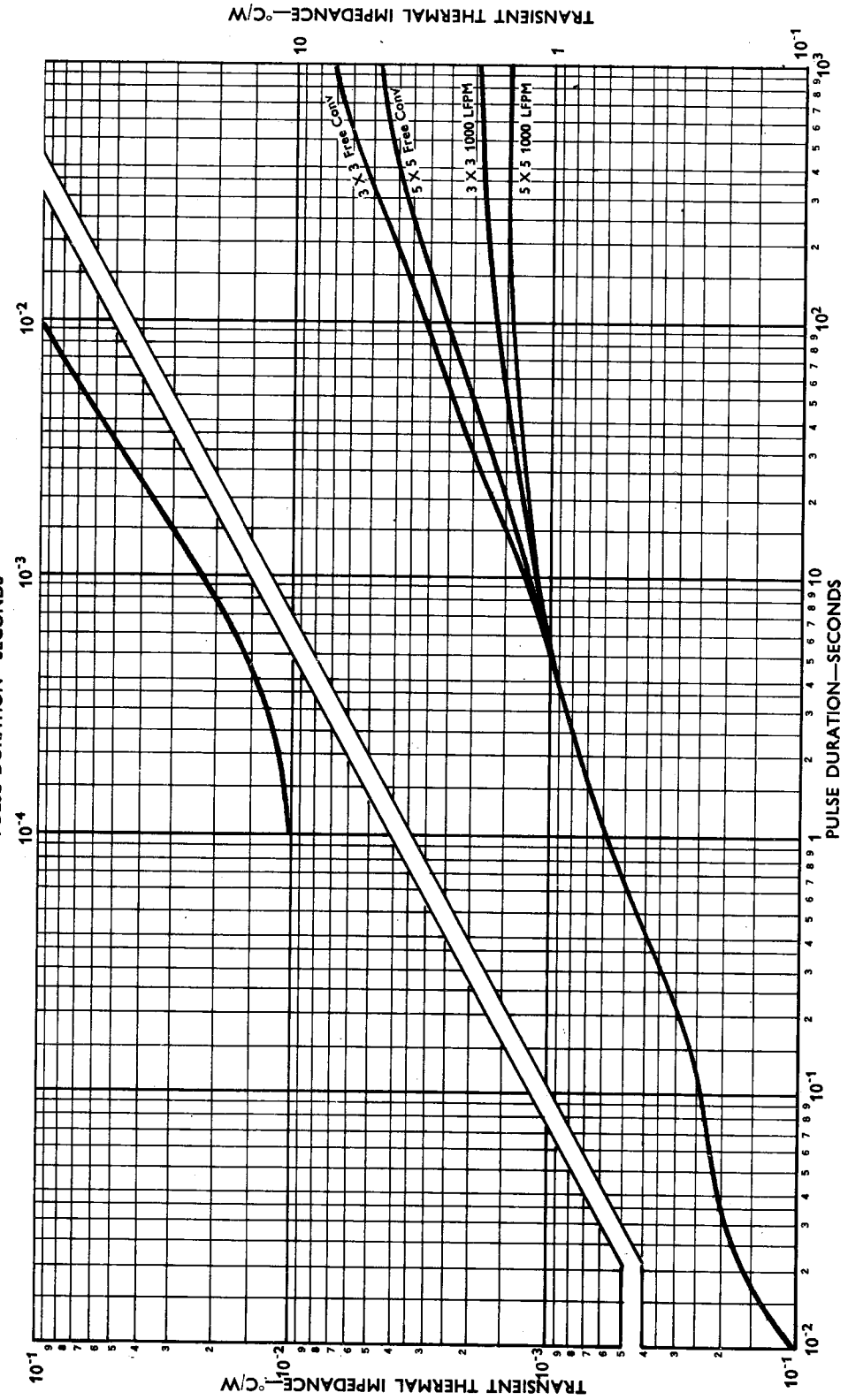
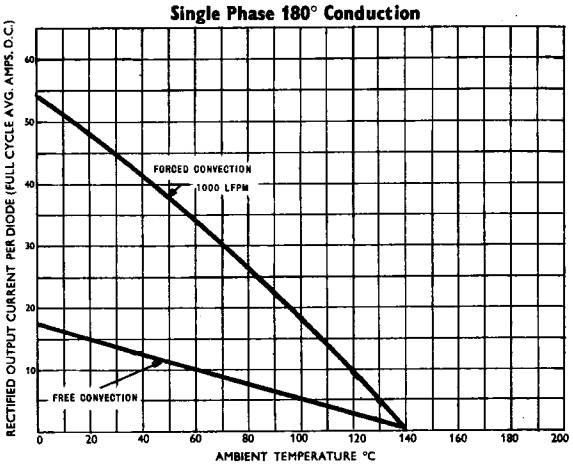


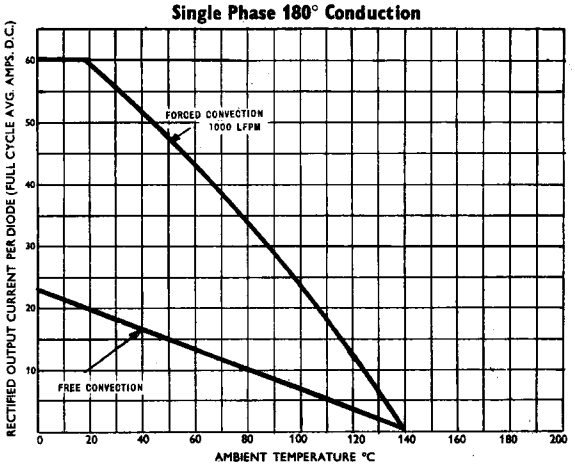
FIG.7 TRANSIENT THERMAL IMPEDANCE

FIG. 8. MAXIMUM FORWARD CURRENT Vs. AMBIENT TEMPERATURE

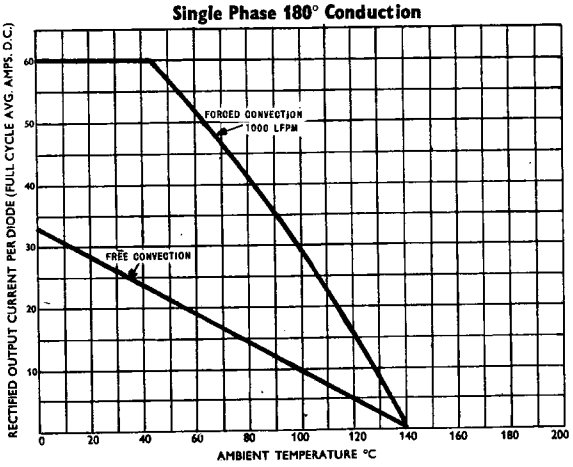
(a) **1 DIODE — Mounted on 2″ × 2″ × 1/16″ Copper Heat Sink**
Single Phase 180° Conduction



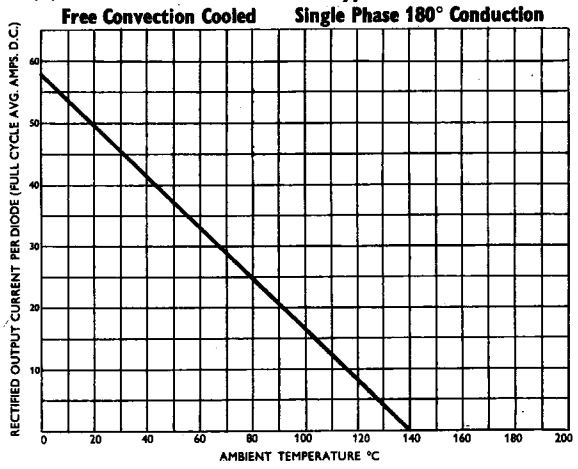
(b) **1 DIODE — Mounted on 3″ × 3″ × 1/16″ Copper Heat Sink**
Single Phase 180° Conduction



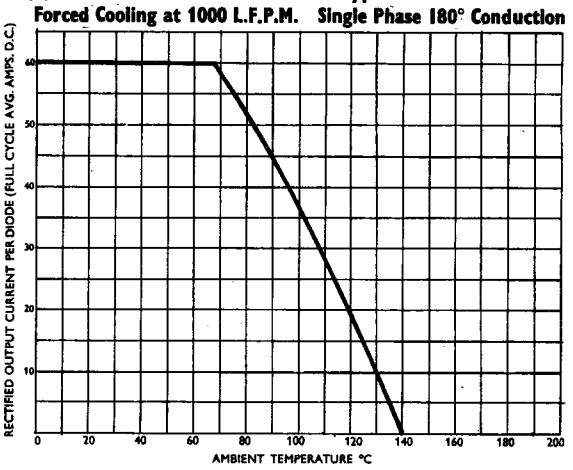
(c) **1 DIODE — Mounted on 5″ × 5″ × 1/16″ Copper Heat Sink**
Single Phase 180° Conduction



(d) **1 DIODE — Mounted on 5″ Type M Extrusion**
Free Convection Cooled Single Phase 180° Conduction

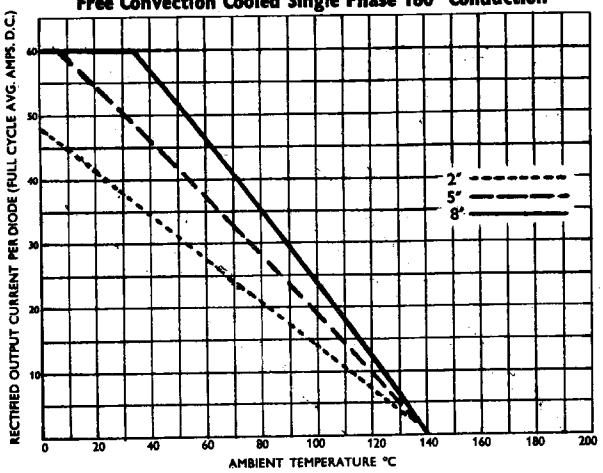


(e) **1 DIODE — Mounted on 5″ Type M Extrusion**
Forced Cooling at 1000 L.F.P.M. Single Phase 180° Conduction

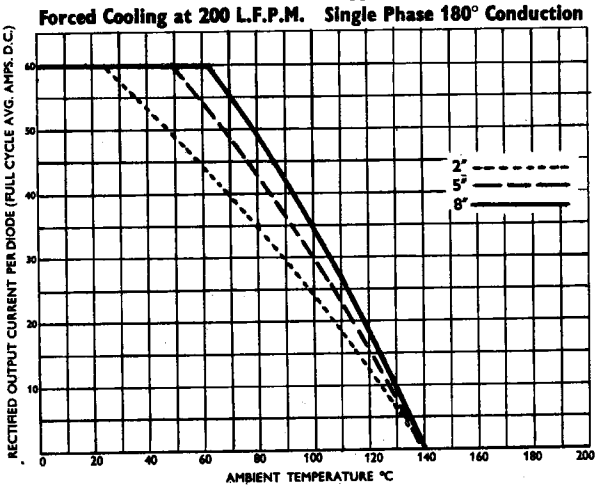


MAXIMUM FORWARD CURRENT Vs. AMBIENT TEMPERATURE

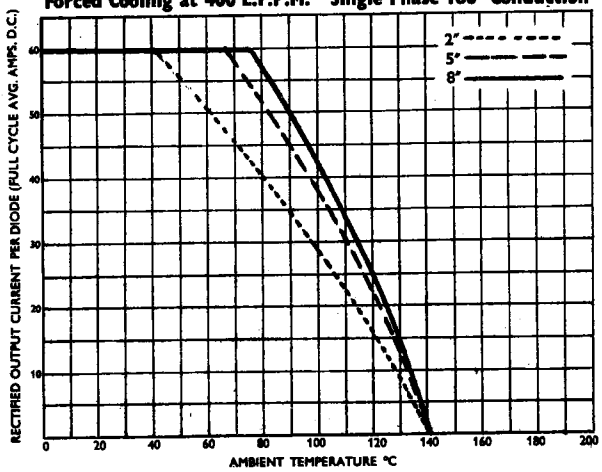
(f) **1 DIODE — Mounted on Type E Extrusion**
Free Convection Cooled Single Phase 180° Conduction



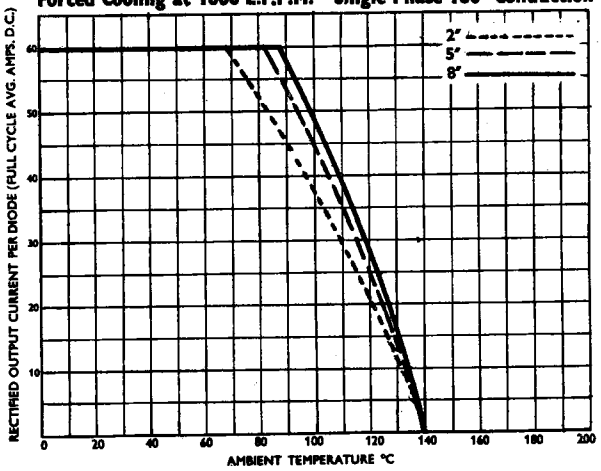
(g) **1 DIODE — Mounted on Type E Extrusion**
Forced Cooling at 200 L.F.P.M. Single Phase 180° Conduction



(h) **1 DIODE — Mounted on Type E Extrusion**
Forced Cooling at 400 L.F.P.M. Single Phase 180° Conduction

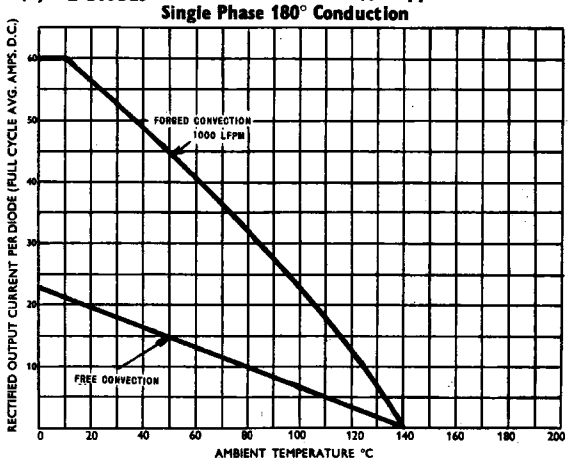


(j) **1 DIODE — Mounted on Type E Extrusion**
Forced Cooling at 1000 L.F.P.M. Single Phase 180° Conduction

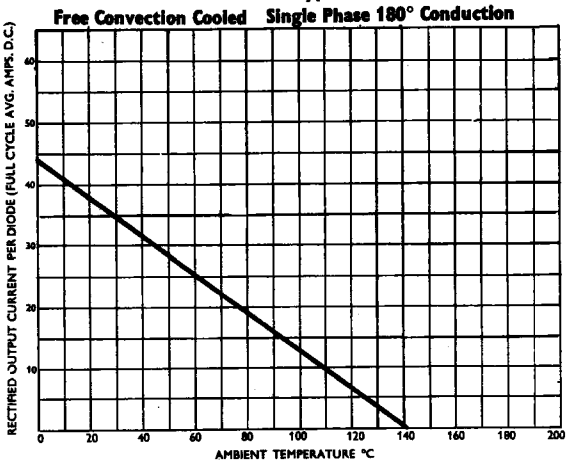


MAXIMUM FORWARD CURRENT Vs. AMBIENT TEMPERATURE

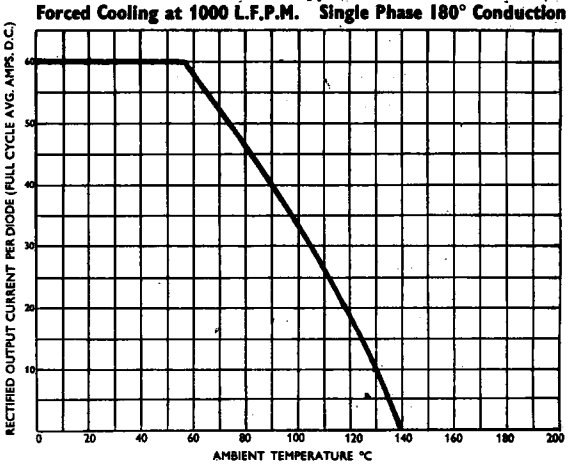
(k) **2 DIODES — Mounted on 5″ × 5″ × $\frac{1}{16}$″ Copper Heat Sink Single Phase 180° Conduction**



(l) **2 DIODES — Mounted on 5″ Type M Extrusion Free Convection Cooled Single Phase 180° Conduction**

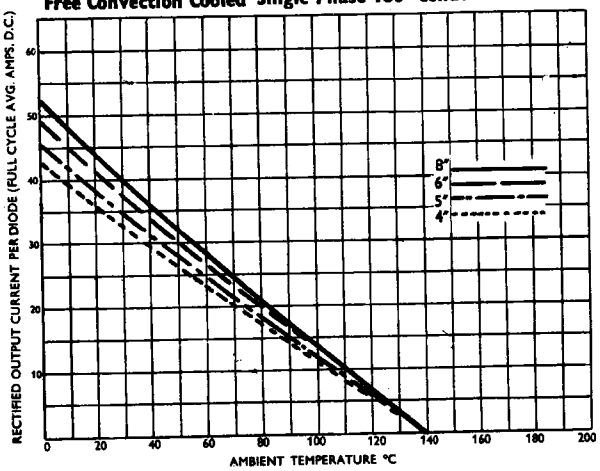


(m) **2 DIODES — Mounted on 5″ Type M Extrusion Forced Cooling at 1000 L.F.P.M. Single Phase 180° Conduction**

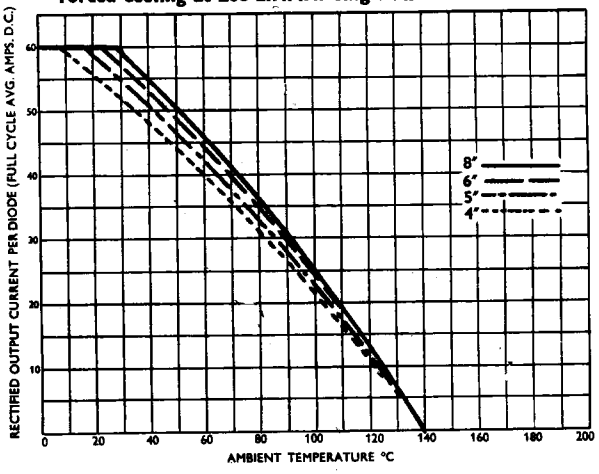


MAXIMUM FORWARD CURRENT Vs. AMBIENT TEMPERATURE

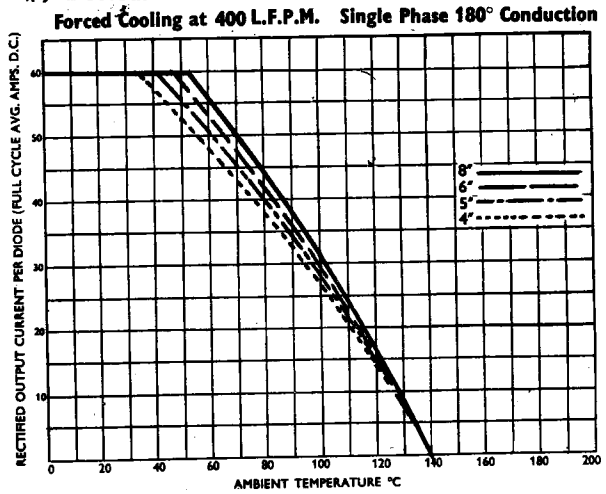
(n) **2 DIODES — Mounted on Type E Extrusion**
Free Convection Cooled Single Phase 180° Conduction



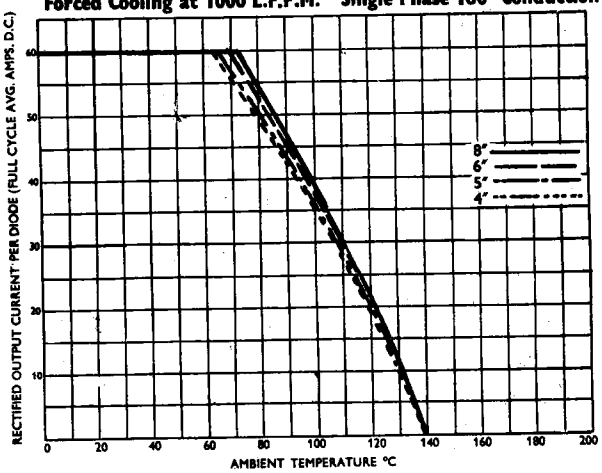
(o) **2 DIODES — Mounted on Type E Extrusion**
Forced Cooling at 200 L.F.P.M. Single Phase 180° Conduction



(p) **2 DIODES — Mounted on Type E Extrusion**
Forced Cooling at 400 L.F.P.M. Single Phase 180° Conduction

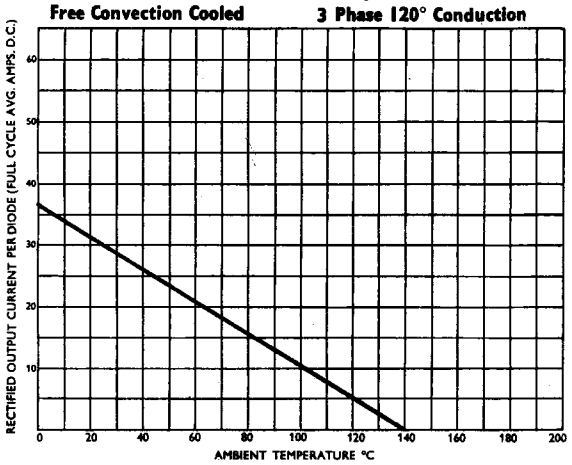


(q) **2 DIODES — Mounted on Type E Extrusion**
Forced Cooling at 1000 L.F.P.M. Single Phase 180° Conduction

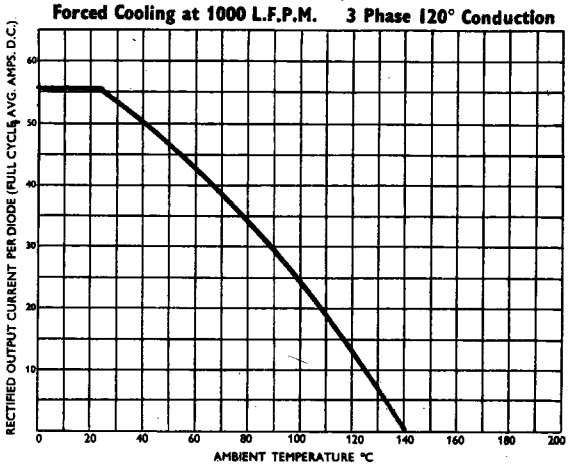


MAXIMUM FORWARD CURRENT Vs. AMBIENT TEMPERATURE

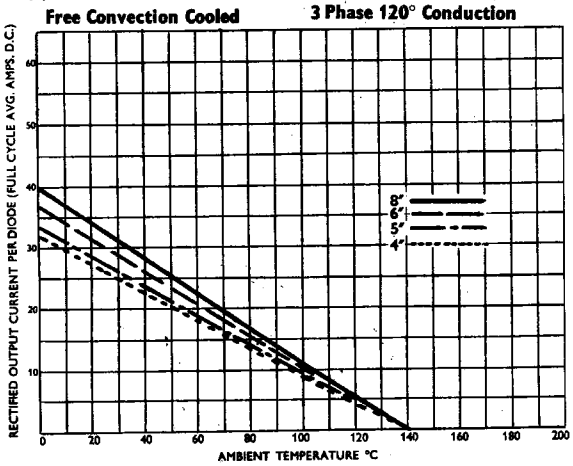
(r) 3 DIODES — Mounted on 5" Type M Extrusion
Free Convection Cooled 3 Phase 120° Conduction



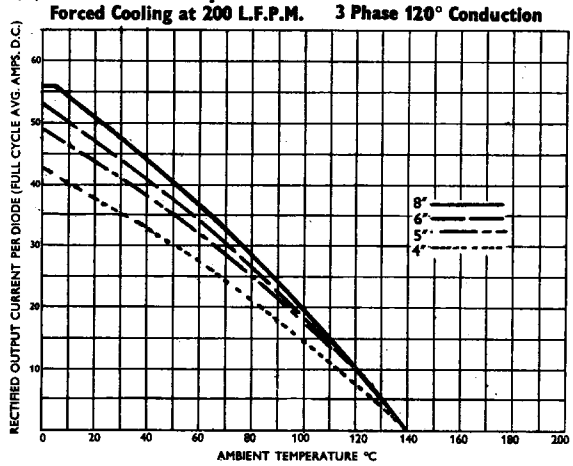
(s) 3 DIODES — Mounted on 5" Type M Extrusion
Forced Cooling at 1000 L.F.P.M. 3 Phase 120° Conduction



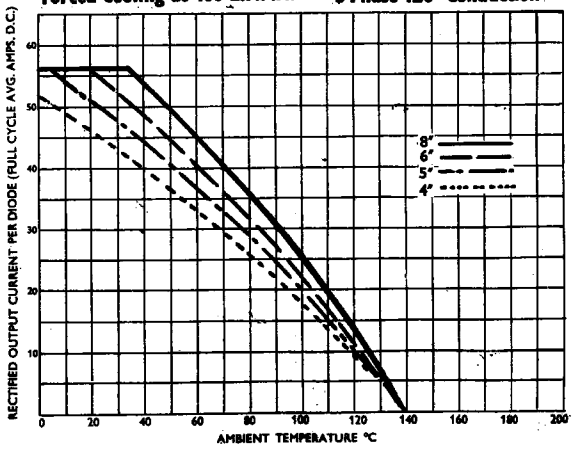
(t) 3 DIODES — Mounted on Type E Extrusion
Free Convection Cooled 3 Phase 120° Conduction



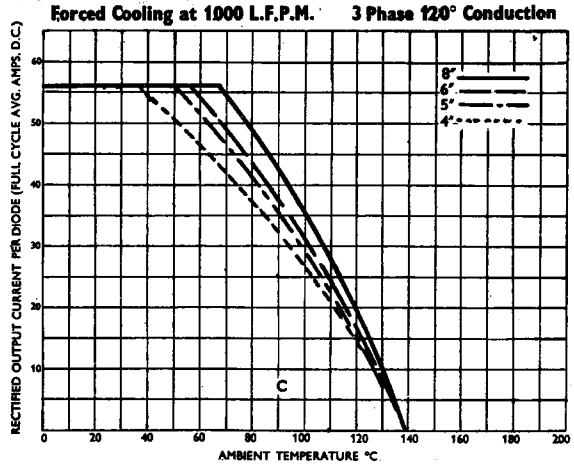
(u) 3 DIODES — Mounted on Type E Extrusion
Forced Cooling at 200 L.F.P.M. 3 Phase 120° Conduction

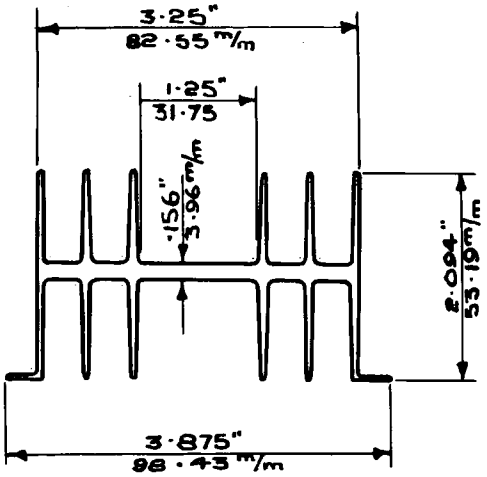


(v) 3 DIODES — Mounted on Type E Extrusion
Forced Cooling at 400 L.F.P.M. 3 Phase 120° Conduction

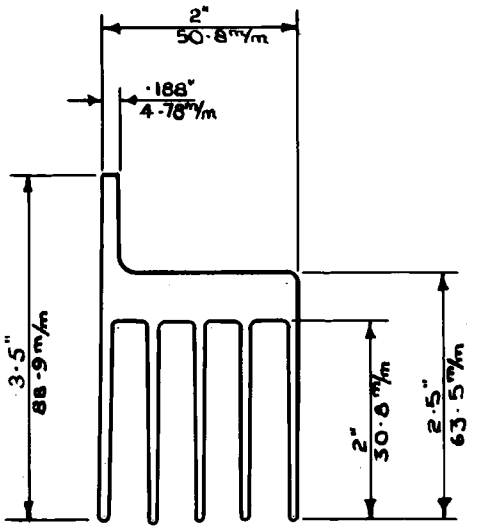


(w) 3 DIODES — Mounted on Type E Extrusion
Forced Cooling at 1000 L.F.P.M. 3 Phase 120° Conduction





a) TYPE "M" EXTRUSION



b) TYPE "E" EXTRUSION

FIG. 9 HEAT SINK SECTIONS