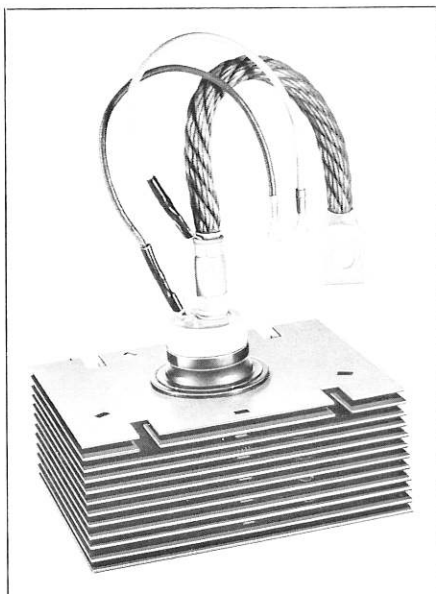


Westinghouse



**Thyristor Silicon  
Controlled Rectifiers  
Westinghouse Type 2231\*  
Type 2232\***

Forward Current 475 Amps RMS  
300 Amperes Half-Wave Average  
Forward Blocking Voltages to 1000 Volts



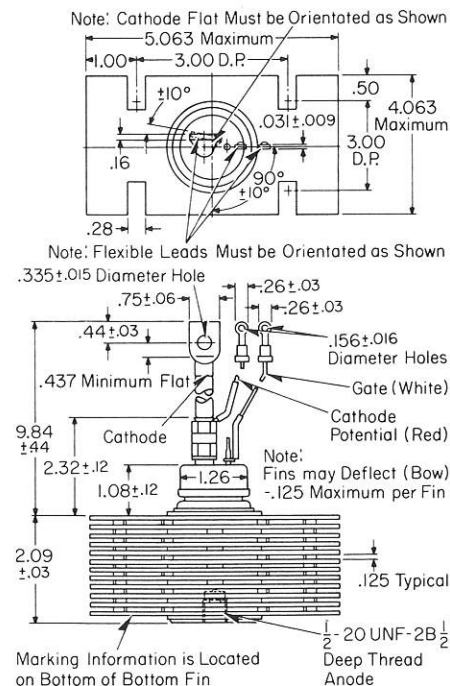
**Application**

Designed for fast switching applications, thyristor SCR Types 2231, 2232 with guaranteed  $t_{on}$  and  $t_{off}$  parameters, are especially suitable for inverters, dc choppers and controlled power systems where high inrush currents are encountered. The surge rating of 4,500 amperes combined with 84,000 amp<sup>2</sup> sec I<sup>2</sup>t rating allows optimum fuse coordination.

The exclusive Westinghouse CBE construction technique eliminates failures caused by thermal stresses by doing away with solder joints. In addition the entire series carries a guaranteed minimum dv/dt rating, and the Westinghouse Lifetime Guarantee.

**\* Westinghouse Lifetime Guarantee**

Westinghouse warrants to the original purchaser that it will correct any defects in workmanship, by repair or replacement f.o.b. factory, for any silicon power semiconductor bearing this symbol  $\clubsuit$ ™ during the life of the equipment in which it is originally installed, provided said device is used within manufacturer's published ratings and applied in accordance with good engineering practice. This warranty shall constitute a fulfillment of all Westinghouse liabilities in respect to said products. This warranty is in lieu of all other warranties expressed or implied. Westinghouse shall not be liable for any consequential damages.



**Maximum Ratings and Characteristics**

Blocking State ( $T_J=125^\circ\text{C}$ ) Symbol Westinghouse Type: Max. Turn-off time: 2231 Series, 30  $\mu\text{sec}$ ; 2232 Series, 40  $\mu\text{sec}$

	2231A 2232A		2231B 2232B		2231D 2232D		2231F 2232F		2231H 2232H		2231K 2232K		2231M 2232M		2231P 2232P		2231S 2232S		2232V		2232Z <sup>③</sup>	
	Repetitive Peak Forward and Reverse Voltage <sup>②</sup> , volts..... $V_{FB}$	50	100	200	300	400	500	600	700	800	900	1000										
Non-Repetitive Transient Peak Forward and Reverse Voltage, volts $\leq 5.0$ msec..... $V_{RBT}$	150	200	300	400	500	600	700	800	900	1000	1100											
Peak Forward and Reverse Leakage Current, mA..... $I_{RB}$	←----- 15 -----→																					

**Conducting State ( $T_J=125^\circ\text{C}$ )** Symbol All Types

RMS Forward Current, amps..... $I_{RMS}$	475
Ave. Forward Current (180° Conduction) amps..... $I_{AVE}$	300
Surge Current (at 60 Hz): 1/2 Cycle, amps.. $I_{FM}$	4500
3 Cycles, amps. $I_{FM}$	3200
10 Cycles, amps. $I_{FM}$	2800
I <sup>2</sup> t for Fusing (at 60 Hz half-wave), amp <sup>2</sup> sec..... $I^2t$	84,000
Forward Voltage Drop at $T_J=25^\circ\text{C}$	
$I_F=100$ Adc, volts..... $V_F$	1.35
$I_F=625$ Adc, volts..... $V_F$	1.85

**Thermal Characteristics**

Oper. Junction Temp. Range, $^\circ\text{C}$ ..... $T_J$	-40 to +125
Storage Temperature Range, $^\circ\text{C}$ ..... $T_{stg}$	-40 to +150
Thermal Impedance, $^\circ\text{C}/\text{Watt}$ : Junction to Ambient..... $\theta_{JA}$	0.18

**Gate Parameters ( $T_J=25^\circ\text{C}$ )** Symbol All Types

Gate Current to Trigger ( $V_{FB}=12\text{V}$ ), ma. $I_{GT}$	300
Gate Voltage to Trigger ( $V_{FB}=12\text{V}$ ), volts. $V_{GT}$	4
Non-Triggering Gate Voltage at $T_J=125^\circ\text{C}$ (Rated $V_{FB}$ ), volts..... $V_{GNT}$	0.15
Peak Forward Gate Current, amps..... $i_{GFM}$	4
Peak Reverse Gate Voltage, volts..... $V_{GRM}$	15
Peak Gate Power, watts..... $P_{GM}$	16
Average Gate Power, watts..... $P_{G(AV)}$	3

**Switching State**

Max. Turn-On Time, $I_F=100$ A, 10-90%, $t_{on}(2231)$	4.0
$V_{FD}=10$ volts <sup>②</sup> , $T_J=25^\circ\text{C}$ , $\mu\text{sec}$ ..... $t_{on}(2232)$	8.0
Min. di/dt, Linear to 0.1 $I_{FM}(\text{surge})$ <sup>④</sup> amps/ $\mu\text{sec}$ ..... di/dt	75
Max. Turn-Off Time, $I_F=250$ A, $T_J=125^\circ\text{C}$ , $di_R/dt=50$ A/ $\mu\text{sec}$ ., $dv/dt=20\text{V}/\mu\text{sec}$ Linear to .8 $V_{FB}$ , $\mu\text{sec}$ ..... $t_{off}(2231)$	30
$t_{off}(2232)$	40
Min. dv/dt, Exp. to .8 $V_{FB}$ , volts/ $\mu\text{sec}$ , $T_J=125^\circ\text{C}$ ..... dv/dt	100

④ With recommended gate drive. See AD 54-560.

② Applies for zero or negative gate voltage.  
③ For higher voltages refer to Westinghouse.

March, 1968  
New Information  
E, D, C/2115/DB; E, D, C/2117

# Thyristor Silicon Controlled Rectifiers Westinghouse Type 2231 Type 2232

Forward Current 475 Amps RMS  
300 Amperes Half-Wave Average  
Forward Blocking Voltages to 1000 Volts

## Electrical Characteristics – Air Flow, 1500 LFM

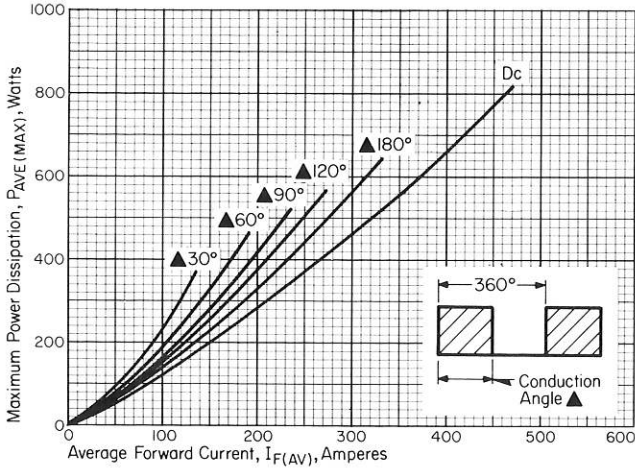


Figure 1. Power dissipation vs forward current, rectangular wave.

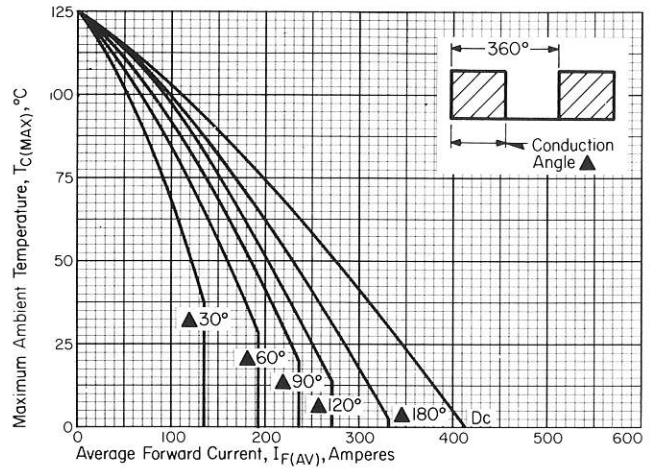


Figure 2. Ambient temperature vs forward current, rectangular wave.

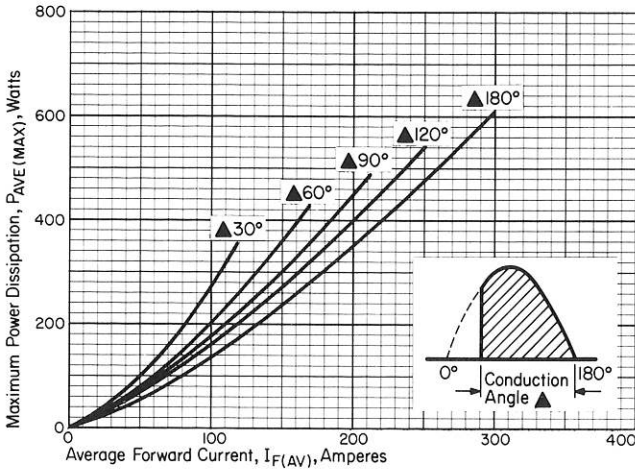


Figure 3. Power dissipation vs forward current, half-wave sinusoid.

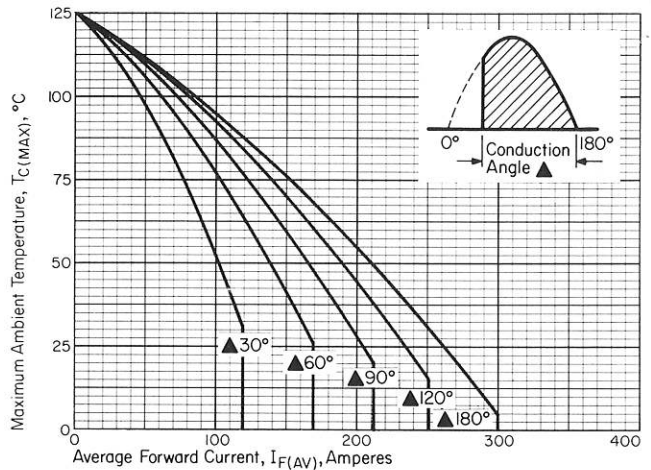


Figure 4. Ambient temperature vs forward current, half-wave sinusoid.

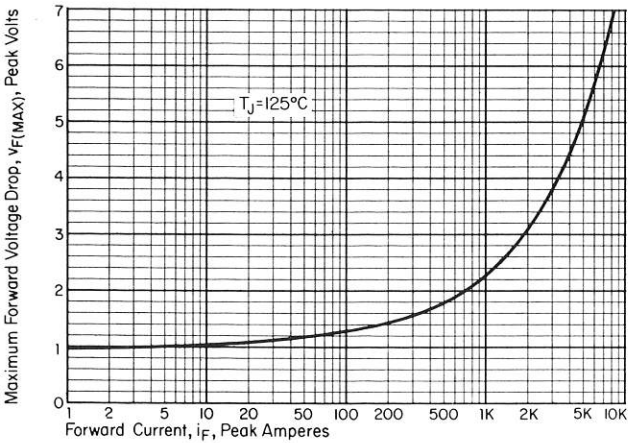


Figure 5. Forward voltage vs forward current.

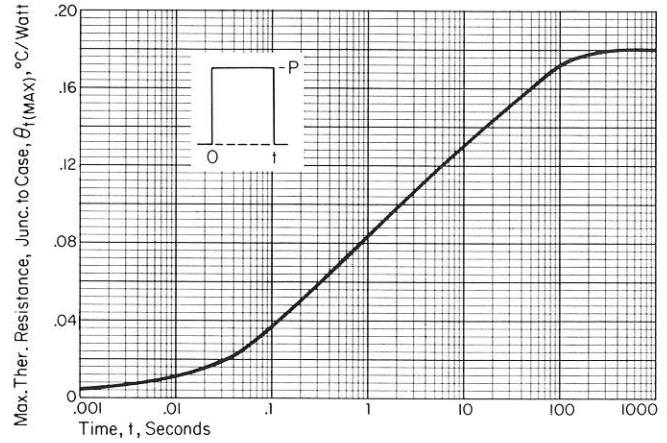


Figure 6. Transient thermal impedance vs time.