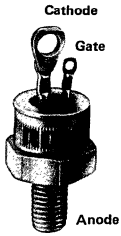


RCA
Solid State
Division

Thyristors

2N681- 2N690

All-Diffused Types for Power-Control and Power-Switching Applications



H-1601

JEDEC TO-48

RCA-2N681 through 2N690 controlled-rectifiers are all-diffused, three-junction, silicon devices for use in power-control and power-switching applications requiring blocking-voltage capabilities to 600 volts and forward-current capability of 16 amperes (average value) or 25 amperes (rms value).

- Symmetrical gate-cathode construction – provides uniform current density, rapid electrical conduction, and efficient heat dissipation
- Direct-soldered internal construction – assures exceptional resistance to fatigue
- Each unit aged at maximum ratings to assure dependable performance
- All-welded construction and hermetic sealing
- Shorted emitter gate-cathode construction
- Low leakage currents, both forward and reverse
- Low forward voltage drop at high current levels
- Low thermal resistance
- Exceptionally high stud-torque capability through use of high-strength copper-alloy stud

FEATURES

- All-diffused construction – assures exceptional uniformity and stability of characteristics
- Multi-diffusion process – permits precise control of individual junction parameters

Absolute-Maximum Ratings, for Operation with Sinusoidal AC Supply Voltage at a Frequency between 50 and 400 Hz and with Resistive or Inductive Load

RATINGS	2N681	2N683	2N684	2N686	2N687	2N689	2N690	UNITS			
		2N682		2N685		2N688					
Transient Peak Reverse Voltage (Non-Repetitive), V_{RM} (non-rep)	35	75	150	225	300	350	400	500	600	720	V
Peak Reverse Voltage (Repetitive), V_{RM} (rep)	25	50	100	150	200	250	300	400	500	600	V
Peak Forward Blocking Voltage (Repetitive), V_{FBOM} (rep)	600										V
Forward Current:											
For case temperature (T_C) of +65°C, and a conduction angle of 180°, I_{FAV}							16			A	
RMS value, I_{FRMS}							25			A	
For other case temperatures and conduction angles							See Fig. 2				
Peak Surge Current, i_{FM} (surge)											
For one cycle of applied voltage, $T_C = 65^\circ\text{C}$							150			A	
For more than one cycle of applied voltage.							See Fig. 3				
Rate of Change of Forward Current: $V_D = V_{DROM}$, $I_{GT} = 200$ mA, $\tau_r = 0.5 \mu\text{s}$ (See Fig. 7), di/dt							200			A/ μs	
Fusing Current (for SCR Protection): $T_j = -65$ to 125°C , $t = 1$ to 8.3 ms, $I^2 t$							50			A ² s	
Peak Gate Power, P_{GM}							5			W	

Absolute-Maximum Ratings, for Operation with Sinusoidal AC Supply Voltage at a Frequency between 50 and 400 Hz and with Resistive or Inductive Load (Cont'd.).

RATINGS	2N681	2N683	2N684	2N686	2N687	2N689	2N690	UNITS
	2N682		2N685		2N688			
Average Forward Gate Power, P _{GAV}	_____				0.5	_____		W
Peak Forward Gate Current, i _{GKM}	_____				2	_____		A
Peak Gate Voltage:								
Forward, v _{GKM}	_____				10	_____		V
Reverse, v _{KGM}	_____				5	_____		V
Temperature:								
Storage, T _{stg}	_____				-65 to +150	_____		°C
Operating, Case [#] , T _C	_____				-65 to +125	_____		°C
Free Air, T _{FA}	_____				See Fig. 4	_____		
Stud Torque; τ _s								
Recommended	_____				35	_____		in-1b
Maximum (DO NOT EXCEED)	_____				50	_____		in-1b

Electrical and Thermal Characteristics at Maximum Electrical Ratings (unless otherwise specified), and at Indicated Case Temperature, T_C.

CHARACTERISTICS	2N681	2N683	2N684	2N686	2N687	2N689	2N690	UNITS			
	2N682		2N685		2N688						
Minimum Forward Breakover Voltage, V _{BOO} :											
At T _C = +125°C	25	50	100	150	200	250	300 400 500	600	V		
Maximum Average (DC) Forward Blocking Current, I _{FBOAV} :											
At T _C = +125°C	6.5	6.5	6.5	6.5	6	5.5	5	4	3	2.5	mA
Maximum Average (DC) Reverse Blocking Current, I _{RBOAV} :											
At T _C = +125°C	6.5	6.5	6.5	6.5	6	5.5	5	4	3	2.5	mA
Maximum Average Forward Voltage Drop, V _{FAY} :											
At a Forward Current of 25 amperes and a T _C = +65°C	_____				0.86	_____		_____	V		
Maximum DC Gate-Trigger Current, I _{GT} :											
At T _C = +125°C	_____				25	_____		_____	mA		
DC Gate-Trigger Voltage, V _{GT} :											
Maximum at T _C = -65° to +125°C	_____				3	_____		_____	V		
Minimum at T _C = +125°C	_____				0.25	_____		_____	V		
Holding Current, i _{HOO} :											
Typical at T _C = +125°C	_____				15	_____		_____	mA		
Maximum Thermal Resistance Junction-to-Case, θ _{J-C}	_____				2	_____		_____	°C/W		

For temperature measurement reference point, see Dimensional Outline.

TYPICAL E-I CHARACTERISTIC OF SILICON CONTROLLED-RECTIFIER

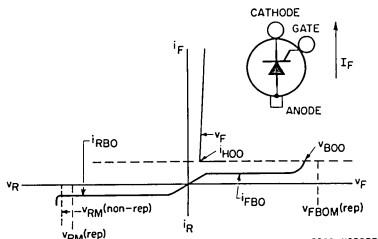


Fig. 1

TERMINAL CONNECTIONS

- No. 1—Gate
- No. 2—Cathode
- Case, No. 3—Anode

RATING CHART

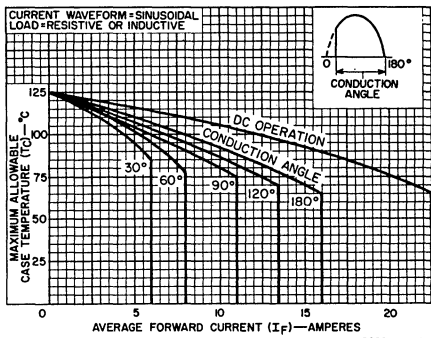


Fig. 2

92CS-1928R3

SURGE CURRENT RATING CHART

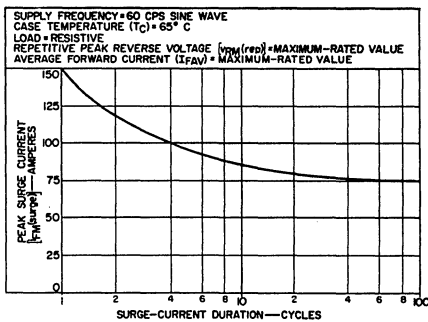


Fig. 3

92CS-1916R1

OPERATION GUIDANCE CHART

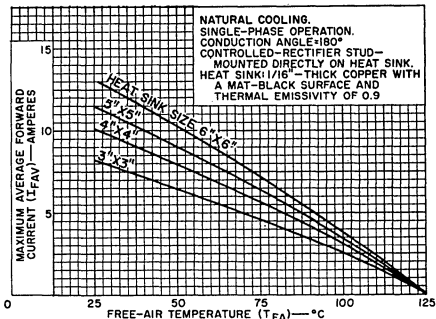


Fig. 4

92CS-1916R1

FORWARD CHARACTERISTICS

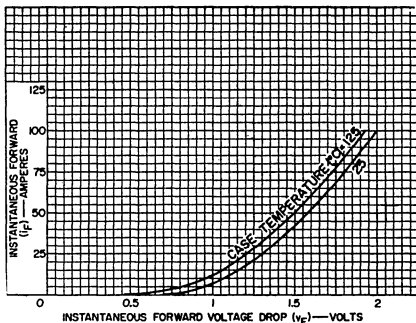


Fig. 5

92CS-1917

FORWARD AND REVERSE LEAKAGE CHARACTERISTICS

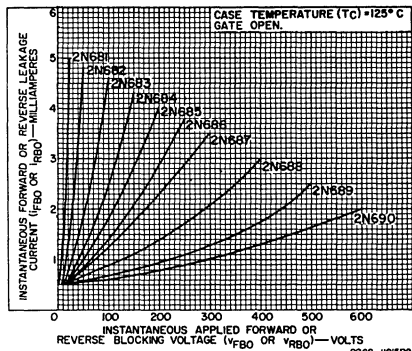


Fig. 6

92CS-1915R2

di/dt CHARACTERISTIC

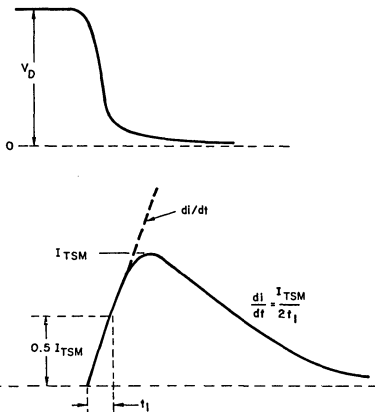


Fig. 7

92CS-17063