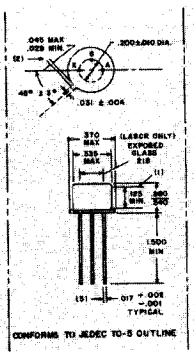
SCR L8,9 L811,L911 (Diamond Base*)

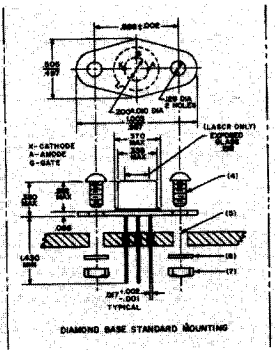
The L8, L9 Light Activated SCR's are basically Silicon Controlled Rectifiers with incident light taking the place of (or adding to) an electrical gate current. Thus it is a photo-operated device that is truly a switch. It features optional gate triggering inputs; i.e., from either an isolated light source or direct electrical supply. The former trigger technique offers a range of light trigger intensity with varying gate bias. The L8, L9 is expected to be particularly useful in such applications as:

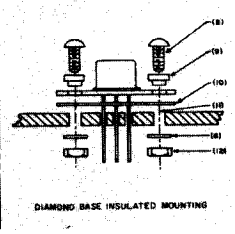
- Optical logic control
- Counting
- Sorting
- Precision Indexing
- Explosion proff isolated switches
- Static Relays
- Meter Relays

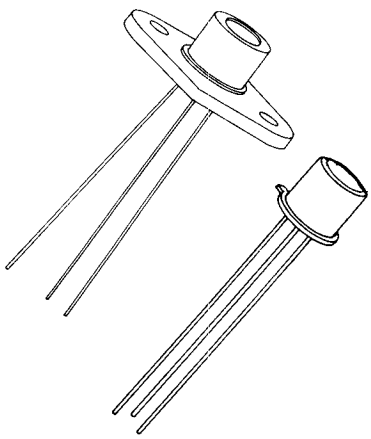
OUTLINE DRAWING

(1) This zone is controlled for automatic handling. The variation in actual diameter within this zone shall not exceed .010.
(2) Measured from max. diameter of the actual device.
(3) The specified lead diameter applies in the zone between .050 and .250 from the base seat. Between .250 and 1.5 maximum of .021 diameter is held. Outside of these the lead diameter is not controlled. Leads may be inserted, without damage in .031 holes while device enters .371 hole concentric with lead hole circle.
(4) #4-40 screw, st'n steel ¼" long
(5) .120 hole (#31 drill)
(6) Int tooth lockwasher, st'n steel
(7) #4-40 nut, st'n steel
(8) #2-56 screw, st'n steel ⅜" long
(9) Shoulder washer, teflon
(10) Mica insulator, .003 thick
(11) .0935 hole (#42 drill)
(12) #2-56 nut, st'n steel
All dimensions in inches









Type†	Peak Forward Blocking Voltage, V_{FXM}, $T_J = -65°C$ to $+100°C$ $R_{GK} = 56{,}000$ Ohms Maximum	Working and Repetitive Peak Reverse Voltage, $V_{ROM\ (wkg)}$ and $V_{ROM\ (rep)}$, $T_J = -65°C$ to $+100°C$	Non-Repetitive Peak Reverse Voltage, $V_{ROM\ (non\text{-}rep)}$ (< 5 Millisec.) $T_J = -65°C$ to $+100°C$
L8U, L9U	25 Volts	25 Volts	40 Volts
L8F, L9F	50 Volts	50 Volts	75 Volts
L8A, L9A	100 Volts	100 Volts	150 Volts
L8G, L9G	150 Volts	150 Volts	225 Volts
L8B, L9B	200 Volts	200 Volts	300 Volts

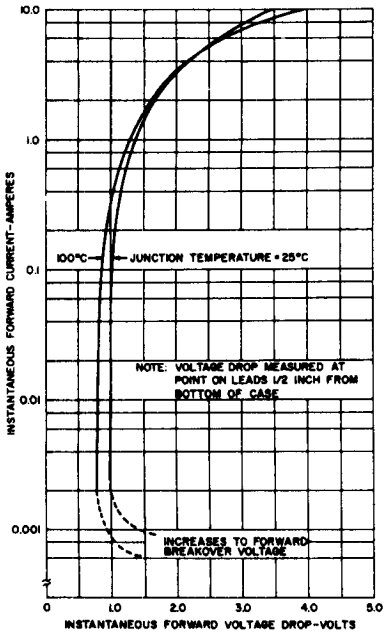
†When ordering the Diamond Base versions, be sure to include the proper voltage letter symbol. For example: The 25 volt, Diamond Base version of the L8U is type number L811U.

Peak Forward Voltage, PFV	300	Volts
RMS Forward Current, On-state	1.6	Amperes
Average Forward Current, On-state	Depends on conduction angle (see charts 11, 12, 15, & 16)	
Peak One Cycle Surge Forward Current (Non-repetitive), I_{FM} (surge)	15	Amperes
I^2t (for fusing)	0.5 (for times < 1.5 milliseconds)	Ampere² seconds
Peak Forward Gate Power Dissipation, P_{GM}	0.1	Watt
Average Forward Gate Power Dissipation, $P_G(AV)$	0.01	Watt
Peak Gate Voltage, Forward & Reverse, V_{GFM} & V_{GRM}	6	Volts
Storage Temperature, T_{stg}	−65°C to +150°C	
Operating Temperature	−65°C to +100°C	
Peak Non-recurrent Surge Forward Current During Turn-on Time Interval (Current Rise Time < 5 Microseconds)	40	Amperes

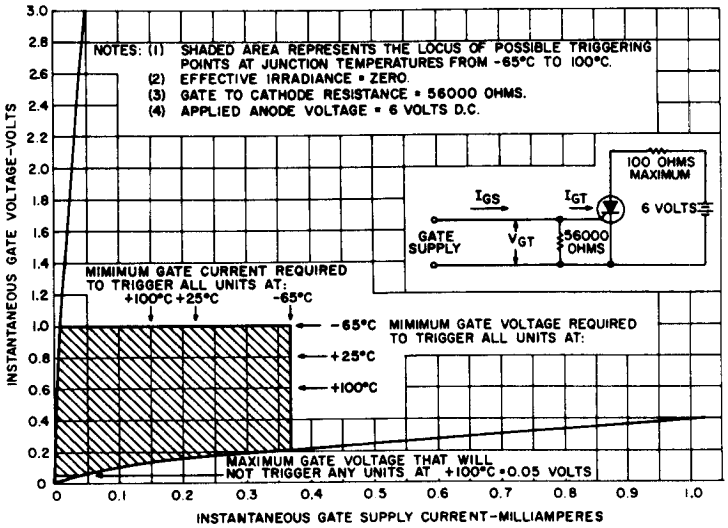
*The L811 and L911 series are identical to the L8 and L9 respectively except that they are soldered to a diamond base heat sink. See charts 14, 15, & 16 for Transient Thermal Resistance and Current Curves, and Page 4 for Outline Drawings.

CHARACTERISTICS

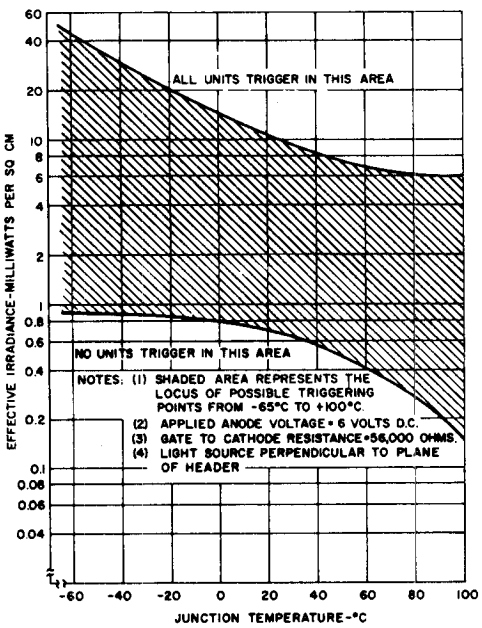
Test	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Forward Breakover Voltage	$V_{(BR)FX}$				Volts	$T_J = -65°C$ to $+100°C$ $R_{GK} = 56{,}000$ Ohms Sinusoidal Waveform, 60 CPS. $H_e < 0.02$ MW/CM² for L9 types $H_e < 0.08$ MW/CM² for L8 types
L8U, L9U		25	——	——		
L8F, L9F		50	——	——		
L8A, L9A		100	——	——		
L8G, L9G		150	——	——		
L8B, L9B		200	——	——		
Forward Blocking Current	I_{FX}	——	2.0	10	μamperes	V_{FX} = Rated V_{FXM}, $R_{GK} = 56{,}000$ Ohms $T_J = +25°C$, $H_e < 0.02$ or 0.08 MW/CM²
		——	40	100	μamperes	V_{FX} = Rated V_{FXM}, $R_{GK} = 56{,}000$ Ohms $T_J = +100°C$, $H_e < 0.02$ or 0.08 MW/CM²
Reverse Blocking Current	I_{RX}	——	2.0	10	μamperes	V_{RX} = Rated $V_{ROM(rep)}$, $R_{GK} = 56{,}000$ Ohms $T_J = +25°C$, $H_e < 0.02$ or 0.08 MW/CM²
		——	40	100	μamperes	V_{RX} = Rated $V_{ROM(rep)}$, $R_{GK} = 56{,}000$ Ohms $T_J = +100°C$, $H_e < 0.02$ or 0.08 MW/CM²
Gate Supply Trigger Current	I_{GS}	——	20	220	μamperes	$V_{FX} = 6$ Vdc, $R_{GK} = 56{,}000$ Ohms, $R_L = 100$ Ohms, $T_J = +25°C$, $H_e = 0$
		——	10	150	μamperes	$V_{FX} = 6$ Vdc, $R_{GK} = 56{,}000$ Ohms, $R_L = 100$ Ohms, $T_J = +100°C$, $H_e = 0$
		——	30	370	μamperes	$V_{FX} = 6$ Vdc, $R_{GK} = 56{,}000$ Ohms, $R_L = 100$ Ohms, $T_J = -65°C$, $H_e = 0$
Gate Trigger Voltage	V_{GT}	0.3	0.5	0.8	Vdc	$V_{FX} = 6$ Vdc, $R_{GK} = 56{,}000$ Ohms, $R_L = 100$ Ohms, $T_J = +25°C$, $H_e = 0$
		——	0.2	0.6	Vdc	$V_{FX} = 6$ Vdc, $R_{GK} = 56{,}000$ Ohms, $R_L = 100$ Ohms, $T_J = +100°C$, $H_e = 0$
		——	0.7	1.0	Vdc	$V_{FX} = 6$ Vdc, $R_{GK} = 56{,}000$ Ohms, $R_L = 100$ Ohms, $T_J = -65°C$, $H_e = 0$
		0.05	0.15	——	Vdc	V_{FX} = Rated V_{FXM}, $R_{GK} = 56{,}000$ Ohms, $R_L = 100$ Ohms, $T_J = +100°C$, $H_e = 0$
Peak On-Voltage	V_{FM}	——	1.2	1.4	Volts	$T_J = +25°C$, $I_{FM} = 1$ ampere Single half sine wave pulse, 2.0 milliseconds wide.
Holding Current	I_{HX}	20	75	560	μamperes	$T_J = +25°C$, $V_{FX} = 5$ Vdc, $H_e = 0$ $R_{GK} = 56{,}000$ Ohms
		10	40	450	μamperes	$T_J = +100°C$, $V_{FX} = 5$ Vdc, $H_e = 0$ $R_{GK} = 56{,}000$ Ohms
		30	180	750	μamperes	$T_J = -65°C$, $V_{FX} = 5$ Vdc, $H_e = 0$ $R_{GK} = 56{,}000$ Ohms
Effective Irradiance to Trigger	H_{ET}				Milliwatts/CM²	$V_{FX} = 6$ Vdc, $R_L = 100$ Ohms $R_{GK} = 56{,}000$ Ohms. Light Source Perpendicular to Plane of Header.
L8		0.68	5.0	10.0		$T_J = +25°C$
L9		0.68	2.0	4.2		
L8		0.15	2.0	6.0		$T_J = +100°C$
L9		0.15	0.7	2.5		
L8		0.9	15.0	50.0		$T_J = -65°C$
L9		0.9	4.0	20.0		
L8		0.02	——	——		$T_J = +100°C$, $R_{GK} = 56{,}000$ Ohms, V_{FX} = Rated V_{FXM}, $R_L = 500$ Ohms, Light Source Perpendicular to Plane of Header.
L9		0.02	——	——		
Rate of Rise of Applied Forward Voltage	dv/dt				Volts/μsec	$T_J = +100°C$, $R_{GK} = 56{,}000$ Ohms
L8U, L9U		0.01	0.02	——		$V_{FXM} = 25$ Volts
L8F, L9F		0.02	0.04	——		$V_{FXM} = 50$ Volts
L8A, L9A		0.05	0.07	——		$V_{FXM} = 100$ Volts
L8G, L9G		0.07	0.10	——		$V_{FXM} = 150$ Volts
L8B, L9B		0.09	0.12	——		$V_{FXM} = 200$ Volts
Delay Time	t_d	——	1 to 100	——	μsec	See Application Note 200.34
Rise Time	t_r	——	0.6	——	μsec	$T_J = +25°C$, $I_F = 1.0$ Ampere, V_{FX} = Rated V_{FXM}
Circuit-Commutated Turn-off Time	t_{off}	——	40	——	μsec	$T_J = +100°C$, $I_{FM} = 1.0$ Ampere, I_R (recovery) = 1.0 Ampere, Reapplied V_{FXM}=Rated V_{FXM}, Rate of Rise of Reapplied. $V_{FXM} = 20$ Volts Per μsec, $R_{GK} = 100$ Ohms, $H_e = 0$



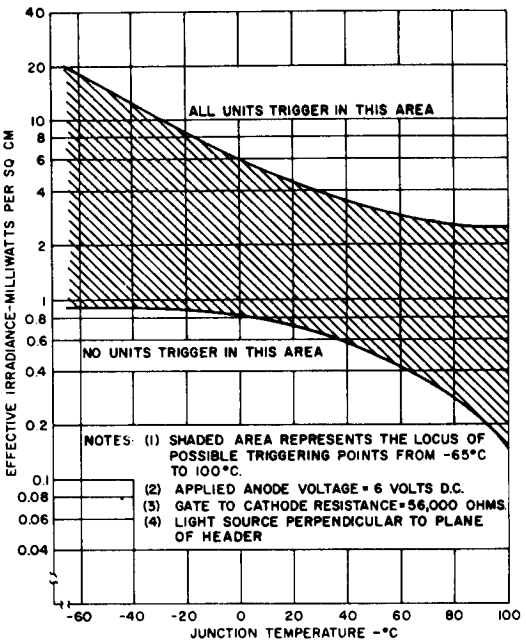
1. MAXIMUM FORWARD CHARACTERISTICS, ON-STATE



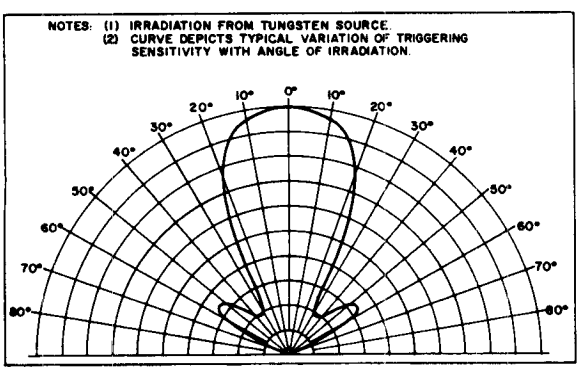
2. ELECTRICAL GATE TRIGGERING CHARACTERISTICS



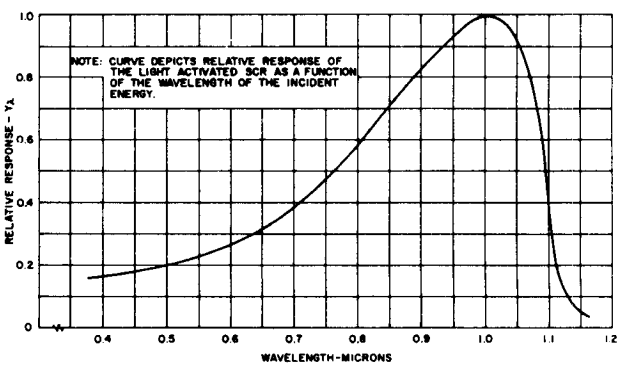
3. L8 LIGHT TRIGGERING CHARACTERISTICS



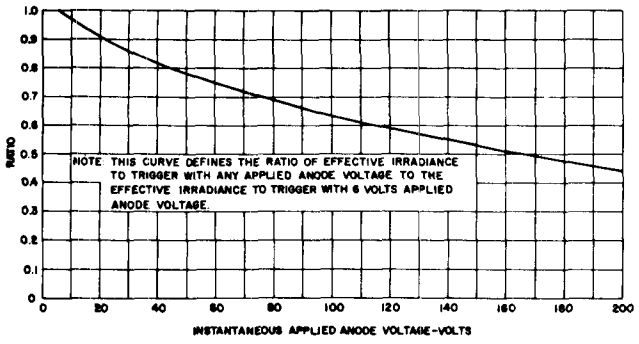
4. L9 LIGHT TRIGGERING CHARACTERISTICS



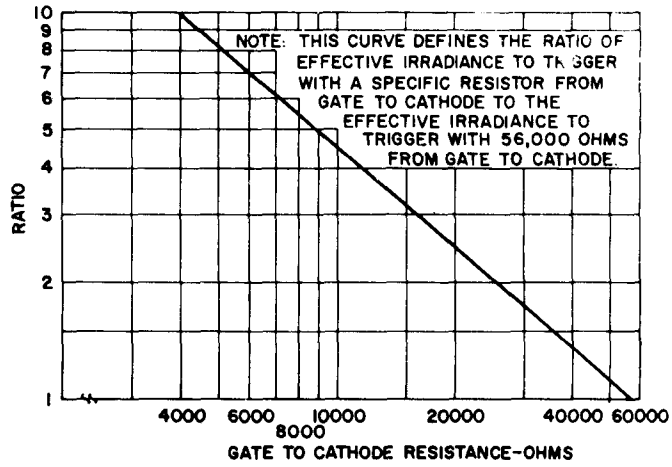
5. TYPICAL ANGULAR RESPONSE



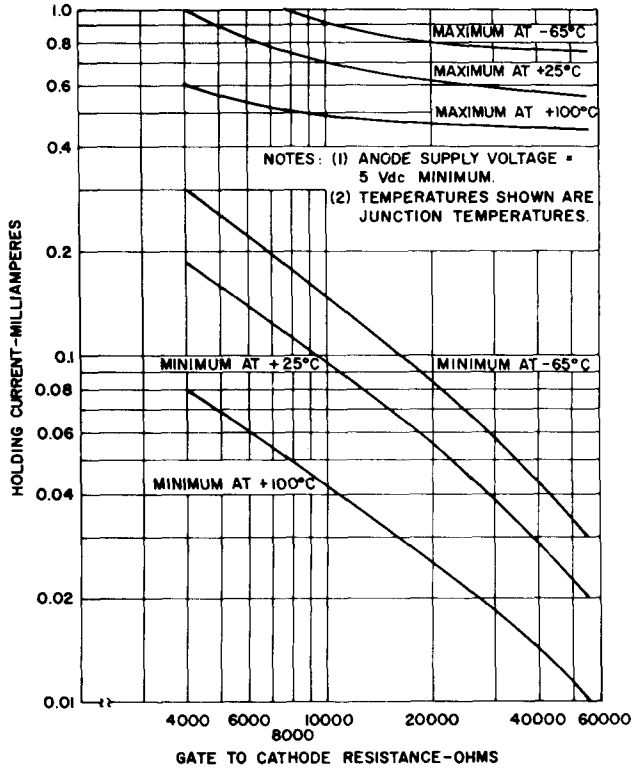
6. TYPICAL SPECTRAL RESPONSE



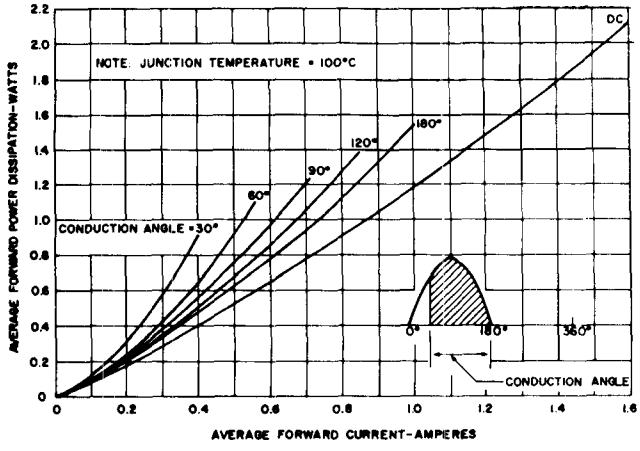
7. TYPICAL VARIATION OF LIGHT SENSITIVITY WITH ANODE VOLTAGE



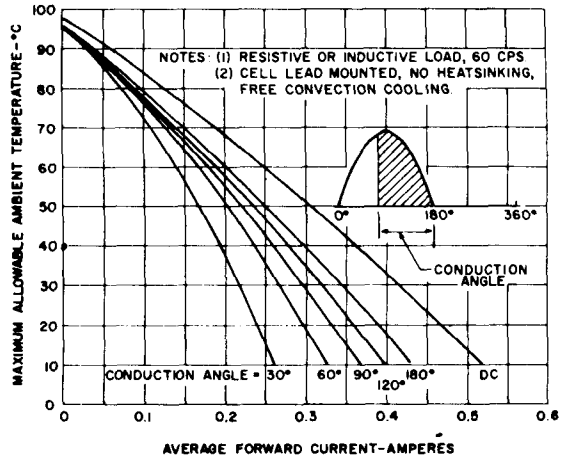
8. TYPICAL VARIATION OF LIGHT SENSITIVITY WITH GATE TO CATHODE RESISTANCE



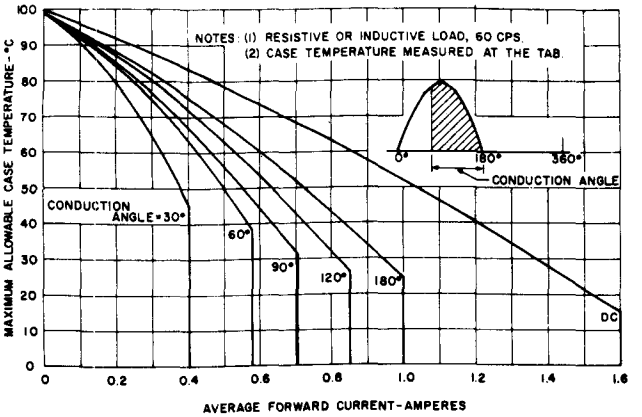
9. VARIATION OF HOLDING CURRENT WITH GATE TO CATHODE RESISTANCE



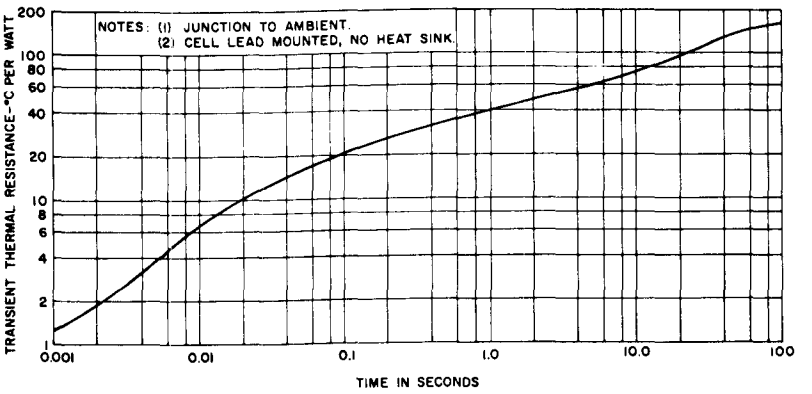
10. FORWARD POWER DISSIPATION FOR HALF WAVE RECTIFIED SINE WAVE



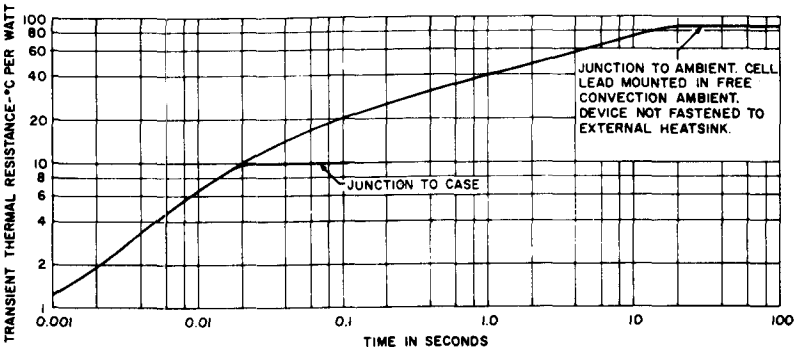
11. MAXIMUM AMBIENT TEMPERATURE FOR HALF WAVE RECTIFIED SINE WAVE



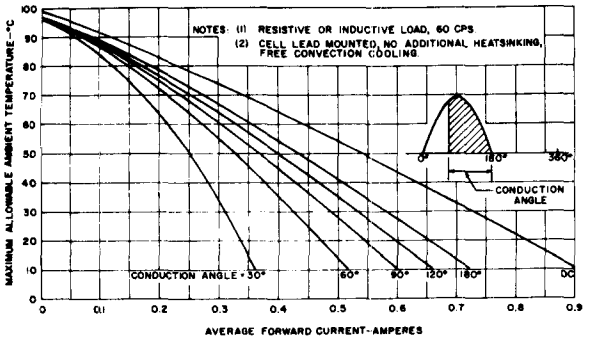
12. MAXIMUM CASE TEMPERATURE FOR HALF WAVE RECTIFIED SINE WAVE



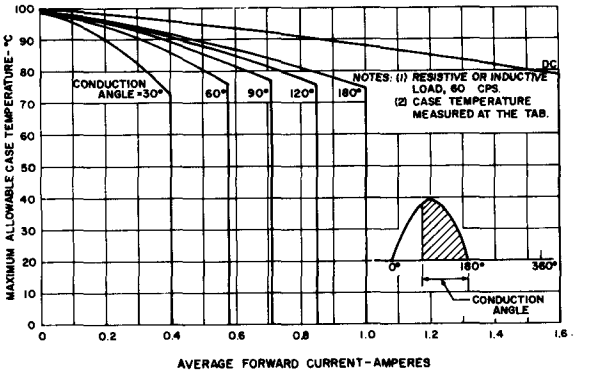
13. MAXIMUM TRANSIENT THERMAL RESISTANCE



14. MAXIMUM TRANSIENT THERMAL RESISTANCE (Diamond Base)



15. MAXIMUM AMBIENT TEMPERATURE FOR HALF WAVE RECTIFIED SINE WAVE (Diamond Base)



16. MAXIMUM CASE TEMPERATURE FOR HALF WAVE RECTIFIED SINE WAVE (Diamond Base)