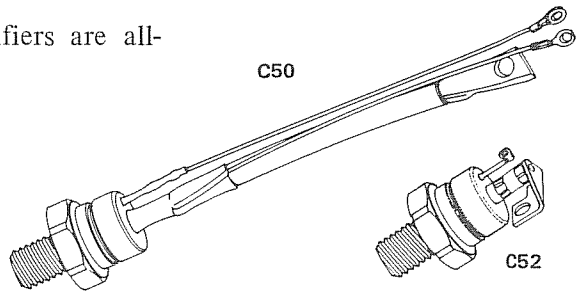
High Power Silicon Controlled Rectifier

110 A RMS 25 to 1200 Volts

C50
C52

The General Electric C50 and C52 Silicon Controlled Rectifiers are all-diffused devices designed for phase control applications.



FEATURES:

- High dv/dt With Selection Available
- Excellent Surge and I^2t Ratings Providing Easy Fusing
- Rugged Hermetic Package

MAXIMUM ALLOWABLE RATINGS

TYPE				REPETITIVE PEAK OFF-STATE VOLTAGE V_{DRM}[1] T_J = -40°C to +125°C	REPETITIVE PEAK REVERSE VOLTAGE V_{RRM}[1] T_J = -40°C to +125°C	NON-REPETITIVE PEAK REVERSE VOLTAGE V_{RSM}[1] T_J = +125°C
C50U	(2N1909)	C52U		25 Volts	25 Volts	25 Volts
C50F	(2N1910)	C52F	(2N1792)	50	50	75
C50A	(2N1911)	C52A	(2N1793)	100	100	150
C50G	(2N1912)	C52G	(2N1794)	150	150	225
C50B	(2N1913)	C52B	(2N1795)	200	200	300
C50H	(2N1914)	C52H	(2N1796)	250	250	350
C50C	(2N1915)	C52C	(2N1797)	300	300	400
C50D	(2N1916)	C52D	(2N1798)	400	400	500
C50E		C52E		500	500	600
C50M		C52M		600	600	720
C50S		C52S		700	700	840
C50N		C52N		800	800	960
C50T		C52T		900	900	1040
C50P		C52P		1000	1000	1200
C50PA		C52PA		1100	1100	1320
C50PB		C52PB		1200	1200	1440

[1] Half sine wave waveform, 10 msec, maximum pulse width.

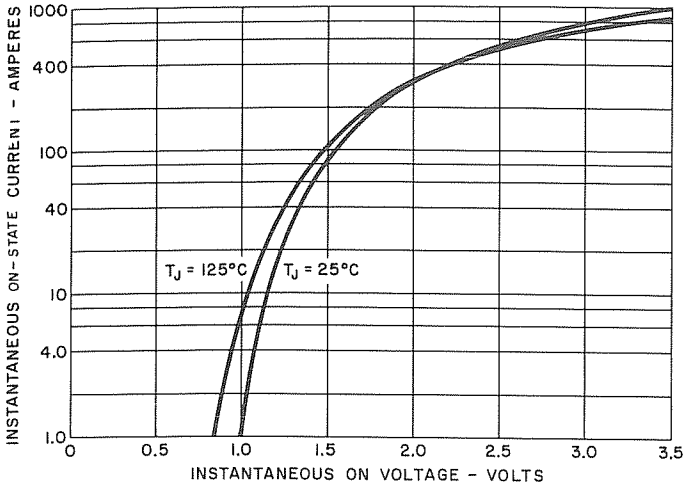
RMS On-State Current, $I_{T(RMS)}$ . . . . . 110 Amperes (All Conduction Angles)
Average On-State Current, $I_{T(AV)}$ . . . . . Depends on Conduction Angles (See Charts 3 and 4)
Critical Rate-of-Rise of On-State Current (Non-Repetitive) di/dt:*
Switching From 1200 Volts . . . . . 100 Amperes Per Microsecond
Switching From 600 Volts . . . . . 200 Amperes Per Microsecond
Peak One-Cycle Surge (Non-Repetitive) On-State Current, I_{TSM} (60 Hz) . . . . . 1000 Amperes
Peak One-Cycle Surge (Non-Repetitive) On-State Current, I_{TSM} (50 Hz) . . . . . 910 Amperes
I^2t (for fusing), for times ≥ 8.3 milliseconds (See Figure 9) . . . . . 4150 (RMS Ampere)^2 Seconds
I^2t (for fusing), for times ≥ 1.5 milliseconds (See Figure 9) . . . . . 2850 (RMS Ampere)^2 Seconds
Peak Gate Power Dissipation, P_{GM} (See Figure 7) . . . . . 100 Watts for 150 Microseconds
Average Gate Power Dissipation, $P_{G(AV)}$ . . . . . 2 Watts
Storage Temperature, T_{stg} . . . . . -40°C to +150°C
Operating Temperature, T_J . . . . . -40°C to +125°C
Stud Torque . . . . . 125 Lbs.-In. (Min.) – 150 Lbs.-In. (Max.)
14 N-m (Min.) – 17 N-m (Max.)

*di/dt ratings established in accordance with EIA-NEMA Standard RS-397, Section 5.2.2.6 for conditions of V_{DRM} stated above; 20 volts, 20 ohms gate trigger source with 0.5 μsec short circuit trigger current rise time.

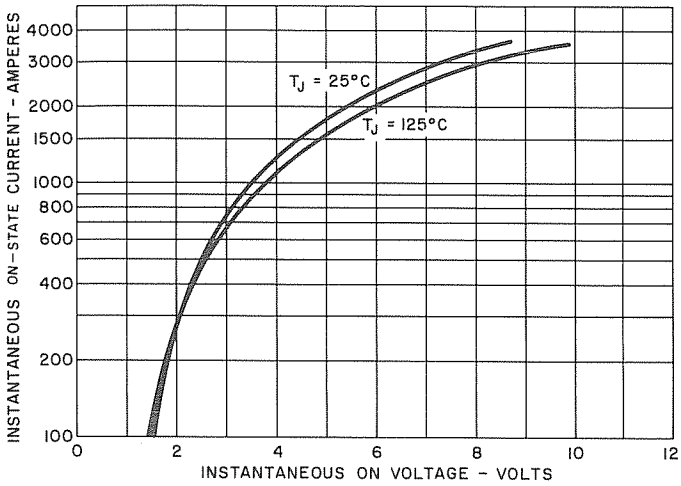
CHARACTERISTICS

TEST	SYMBOL	MIN.	MAX.	UNITS	TEST CONDITIONS
Repetitive Peak Reverse and Off-State Current	I_{DRM} and I_{RRM}	–	10	mA	T_J = -40°C to +125°C $V_{DRM} = V_{RRM}$
C50, C52U (2N1909)					25 Volts Peak
C50, C52F					50
C50, C52A (2N1910) (2N1792)					100
C50, C52G (2N1911) (2N1793)					150
C50, C52B (2N1912) (2N1794)					200
C50, C52H					250
C50, C52C (2N1913) (2N1795)					300
C50, C52D (2N1914) (2N1796)					400
C50, C52E (2N1915) (2N1797)					500
C50, C52M					600
C50, C52S (2N1916) (2N1798)					700
C50, C52N					800
C50, C52T					900
C50, C52P					1000
C50, C52PA					1100
C50, C52PB					1200
DC Gate Trigger Current	I_{GT}	–	75	mAdc	T_C = +25°C, V_D = 6 Vdc, R_L = 3 Ohms $t_p \geqslant 20$ μsec
		–	130		T_C = -40°C, V_D = 6 Vdc, R_L = 3 Ohms $t_p \geqslant 20$ μsec
		–	40		T_C = +125°C, V_D = 6 Vdc, R_L = 3 Ohms $t_p \geqslant 20$ μsec
DC Gate Trigger Voltage	V_{GT}	–	3.0	Vdc	T_C = -40°C to +125°C, V_D = 6 Vdc, R_L = 50 Ohms, $t_p \geqslant 20$ μsec
		.25	–		T_C = +125°C, V_D = Rated, R_L = 1000 Ohms, t_p = 20 μsec
Peak On-State Voltage	V_{TM}	–	2.5	Volts	T_C = +25°C, I_{TM} = 500 Amps. Peak. Duty Cycle ⩽ 0.01%
Holding Current	I_H	–	100	mAdc	T_C = +25°C, Anode Supply = 24 Vdc. Initial Forward Current = 2 Amperes
Thermal Resistance	$R_{\theta JC}$	–	0.4	°C/Watt	Junction-to-Case
Critical Rate-of-Rise of Off-State Voltage. (Higher values may cause device switching.)	dv/dt	200	–	Volts/ μsec	T_J = +125°C, Rated V_{DRM} Using Linear Exponential Rising Waveform, Gate Open Circuited. Exponential dv/dt = V_{DRM} (.632).
Circuit Commutated Turn-Off Time (Typical)	t_q	–	80	μsec	(1) T_C = +120°C (2) I_T = 50 Amps. (3) V_R = 50 Volts Min. (4) V_{DRM} (Reapplied) = Rated (5) Rate-of-Rise of Reapplied Forward Blocking Voltage = 20 V/μsec (Linear) (6) Gate Bias; 0 Volts, 100 Ohms During Turn-Off Interval (7) Duty Cycle ⩽ .01%.

Higher minimum dv/dt selections available, consult factory.



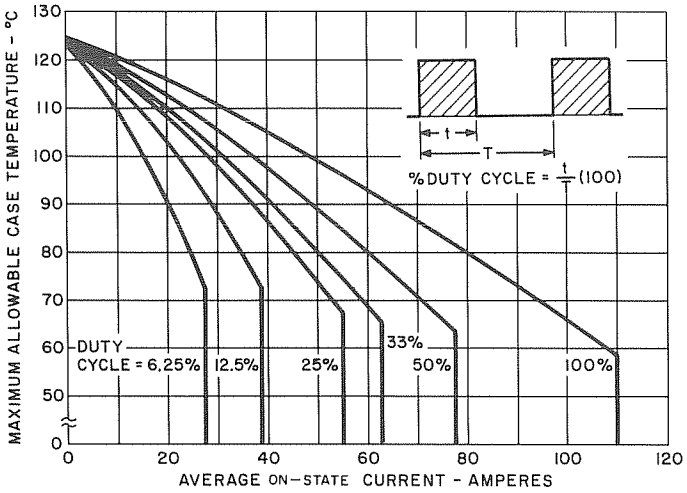
1. MAXIMUM ON-STATE CHARACTERISTICS



2. MAXIMUM ON-STATE CHARACTERISTICS (HIGH CURRENT LEVEL)

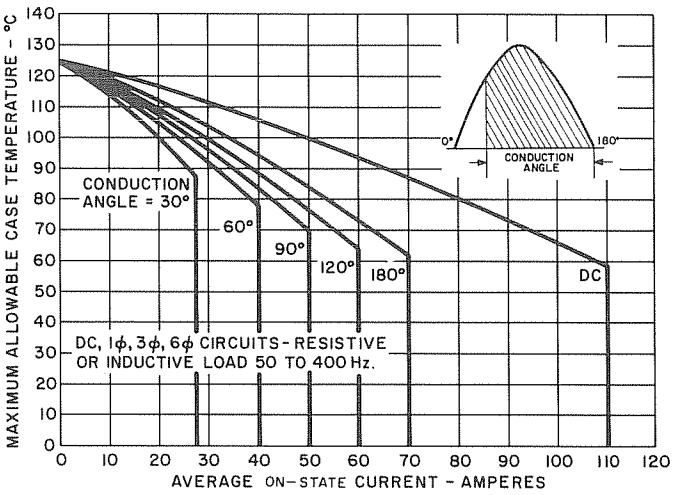
50 TO 400 Hz AC LINE OPERATION

SQUARE WAVE

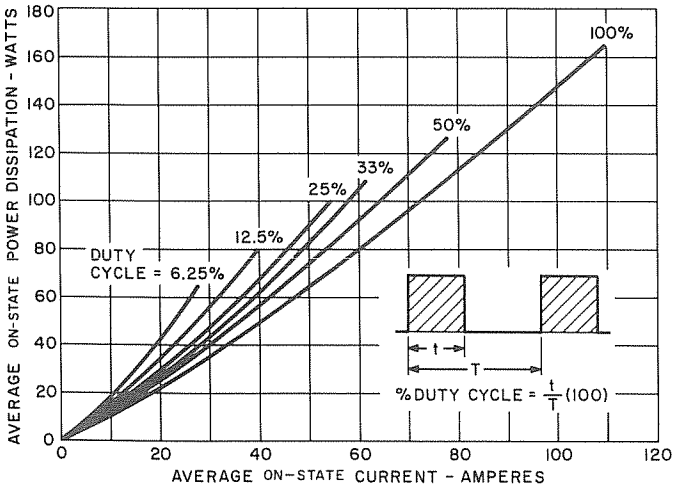


3. MAXIMUM ALLOWABLE CASE TEMPERATURE FOR RECTANGULAR CURRENT WAVEFORM

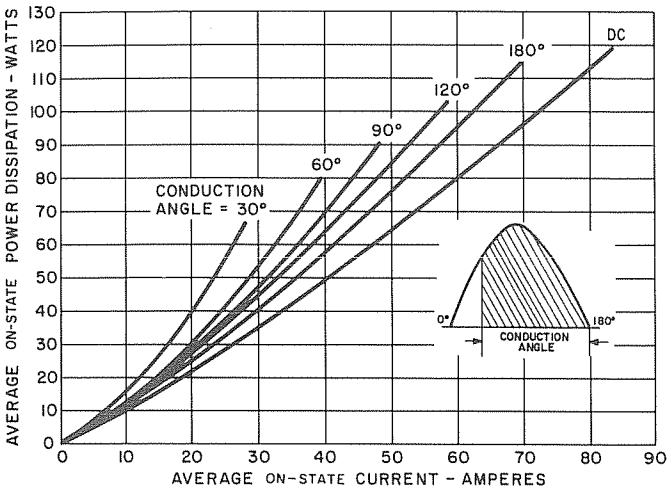
SINUSOIDAL



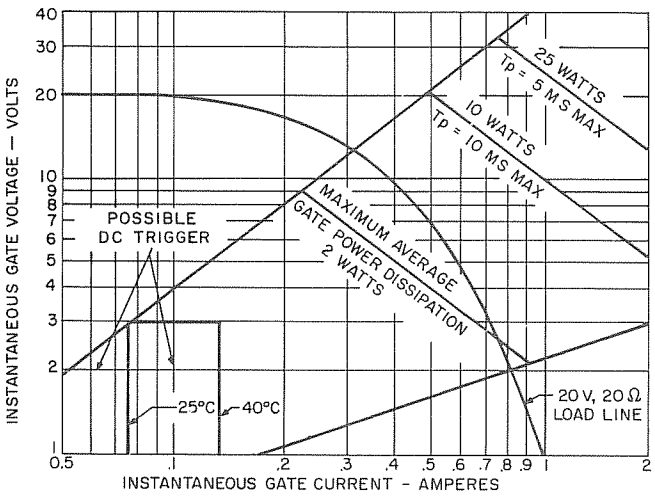
4. MAXIMUM ALLOWABLE CASE TEMPERATURE FOR SINUSOIDAL CURRENT WAVEFORM



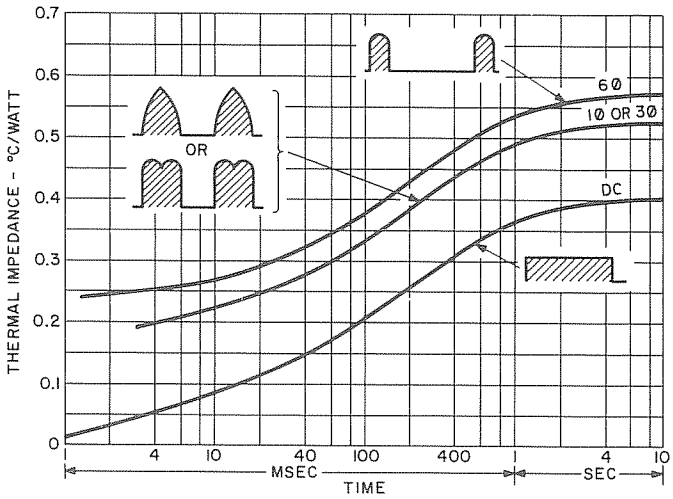
5. MAXIMUM ON-STATE POWER DISSIPATION FOR RECTANGULAR CURRENT WAVEFORM



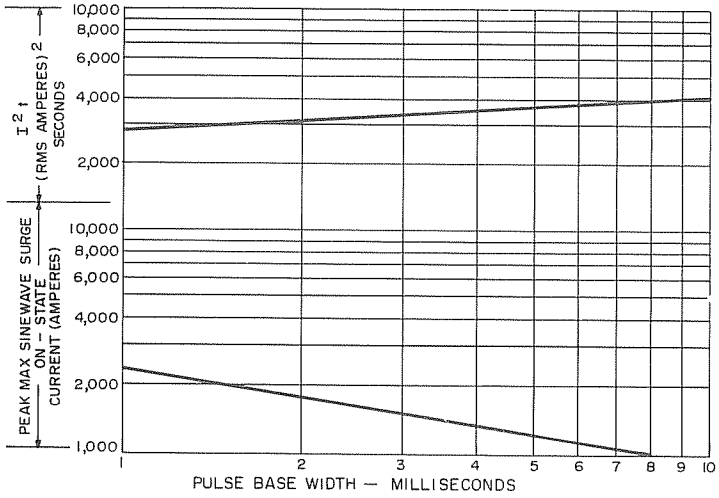
6. MAXIMUM ON-STATE POWER DISSIPATION FOR SINUSOIDAL CURRENT WAVEFORM



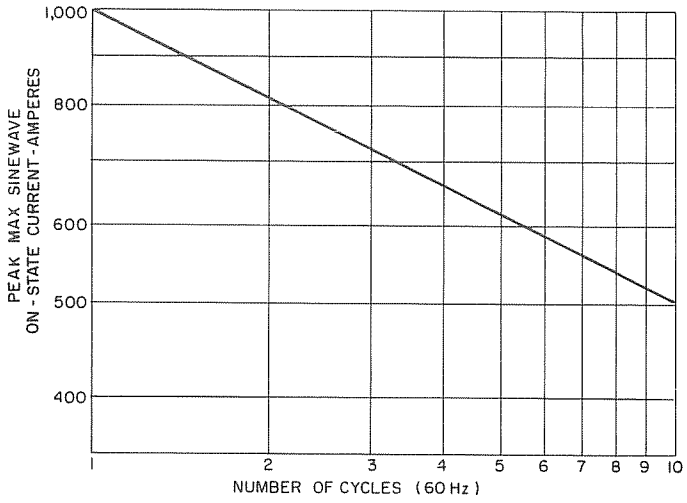
7. GATE TRIGGERING CHARACTERISTICS AND POWER RATINGS



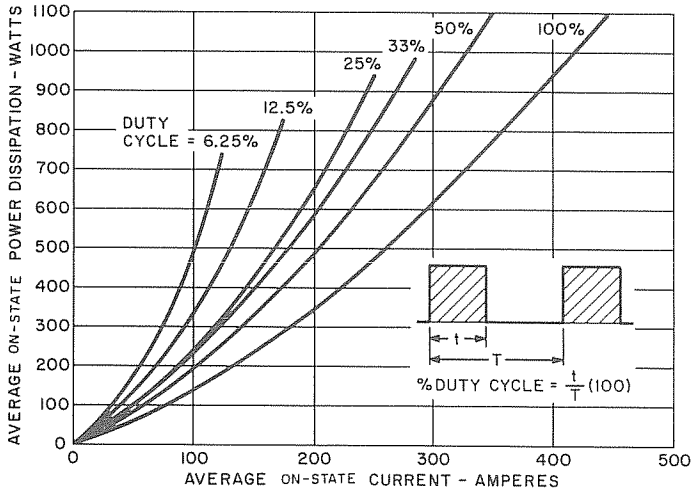
8. TRANSIENT THERMAL IMPEDANCE – JUNCTION-TO-CASE



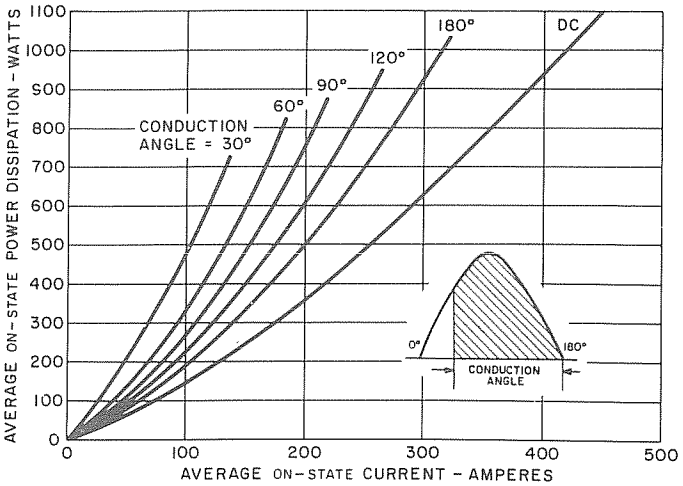
9. SUB-CYCLE SURGE (NON-REPETITIVE) ON-STATE CURRENT AND I^2t RATING



10. SURGE (NON-REPETITIVE) ON-STATE CURRENT

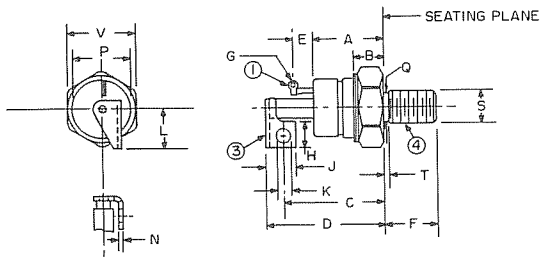


11. MAXIMUM ON-STATE POWER DISSIPATION FOR RECTANGULAR CURRENT WAVEFORM (EXTENDED RANGE)



12. MAXIMUM ON-STATE POWER DISSIPATION FOR SINUSOIDAL CURRENT WAVEFORM (EXTENDED RANGE)

OUTLINE DRAWINGS

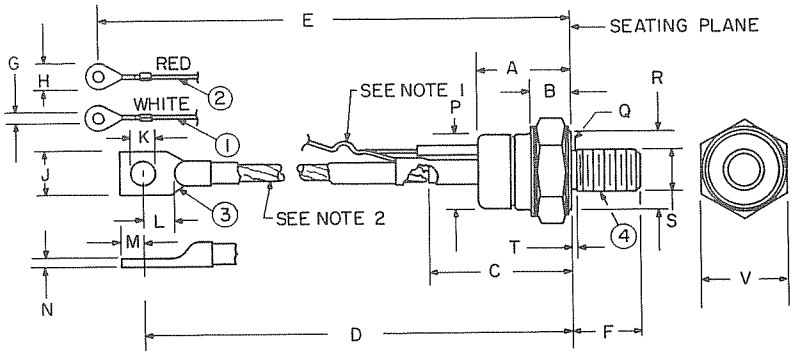


MODEL	TERMINAL ①	TERMINAL ③	TERMINAL ④	S THREAD SIZE
C52	GATE	CATHODE +	ANODE −	1/2-20 UNF-2A

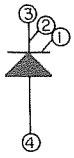
SYM	INCHES MIN.	INCHES MAX.	METRIC MM MIN.	METRIC MM MAX.	SYM.	INCHES MIN.	INCHES MAX.	METRIC MM MIN.	METRIC MM MAX.	NOTES
A	1.020	1.140	25.90	28.96	L	.590	.640	14.98	16.26	
B	.390	.500	9.90	12.70						
C	1.460 REF.		7.92 REF.		N	.058	.070	1.47	1.78	
D	1.660	1.800	42.16	45.72						
E	.312 REF.		7.92 REF.		P	.840	.910	21.33	23.11	
F	.797	.827	20.24	21.01						
G	.060	.075	1.52	1.91	Q	.425	.499	10.79	12.67	
H	.385	.415	9.77	10.54	T	—	.060	—	1.52	2
J	.445	.485	11.30	12.32	V	1.052	1.063	26.72	27.00	
K	.198	.212	5.02	5.38						

NOTES:

1. One nut and one lockwasher supplied with each unit. Material of hardware is steel, cad plated.
2. "T" dimension is area of unthreaded portion. Complete threads are within 2.5 threads of seating plane.
3. Angular orientation of terminals is undefined.



MODEL	TERMINAL ①	TERMINAL ②	TERMINAL ③	TERMINAL ④	S THREAD SIZE
C50	GATE	AUX CATHODE	CATHODE +	ANODE −	1/2 20UNF-2A



SYM	INCHES MIN.	INCHES MAX.	METRIC MM MIN.	METRIC MM MAX.	SYM	INCHES MIN.	INCHES MAX.	METRIC MM MIN.	METRIC MM MAX.	NOTES
A	1.020	1.140	25.90	28.96	L	.330	—	8.38	—	
B	.390	.500	9.90	12.70	M	.275	.325	6.98	8.26	
C	1.570	1.750	39.87	44.45	N	.065	.095	1.65	2.41	
D	6.000	6.390	152.40	162.31	P	.840	.910	21.33	23.11	
E	6.850	7.500	173.99	190.50	Q	.425	.499	10.79	12.67	
F	.797	.827	20.24	21.01	R	.920	—	23.36	—	4
G	.140	.150	3.55	3.81	T	—	.060	—	1.57	5
H	—	.300		7.62						
J	.500	.610	12.70	15.49	V	1.052	1.063	26.72	27.00	
K	.260	.281	6.60	7.14						

NOTES:

1. Gate and auxiliary cathode leads supplied lightly twisted together.
2. Flexible copper lead.
3. One nut and one lockwasher supplied with each unit. Material of hardware is steel, cad plated.
4. "R" dimension is diameter of effective seating area.
5. "T" dimension is area of unthreaded portion. Complete threads are within 2.5 threads of seating plane.
6. Angular orientation of terminals is undefined.

NOTES:

UNIT	WITH HARDWARE OUNCES	WITH HARDWARE GRAMS	WITHOUT HARDWARE OUNCES	WITHOUT HARDWARE GRAMS
C50	4.25	120	3.50	99
C52	3.50	99	2.75	78